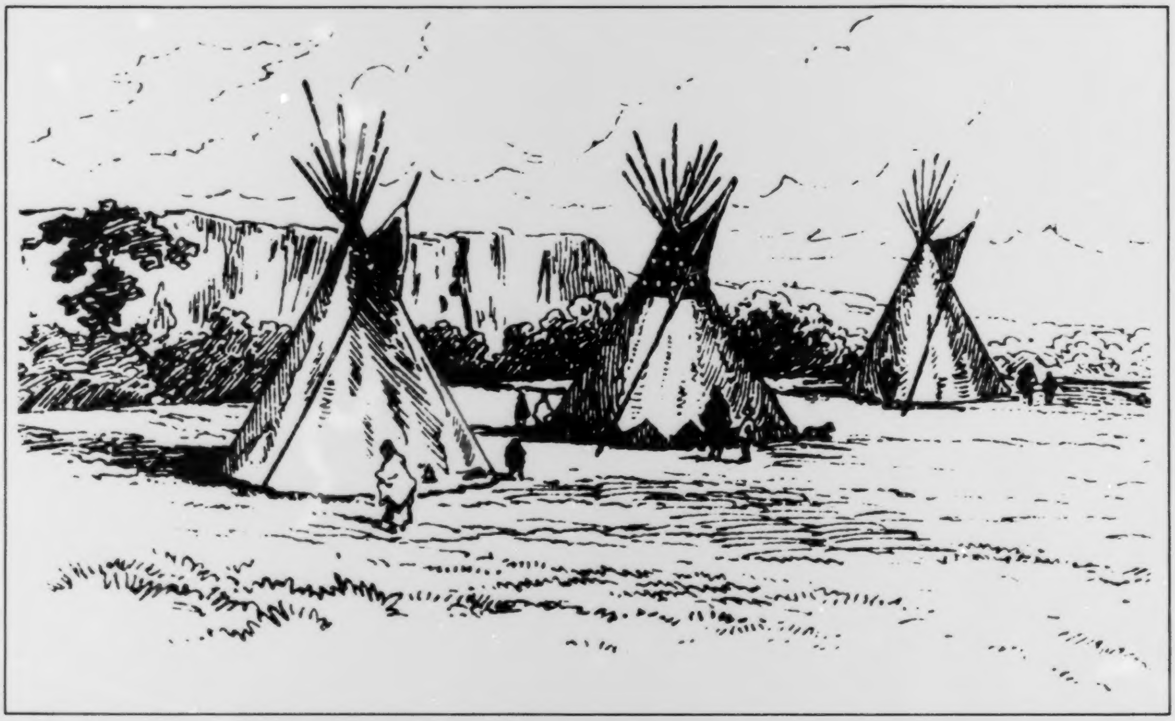
THE ROSS SITE
(DlPd-3)
1980 RESEARCH

J. Roderick Vickers



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1989

Alberta
CULTURE AND MULTICULTURALISM

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1980 RESEARCH

By

J. Roderick Vickers

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THE ROSS SITE (DlPd-3)
1980 RESEARCH

By

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Archaeological Survey of Alberta

with appendices by

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1989

ABSTRACT

In 1980, the Archaeological Survey of Alberta conducted a brief test excavation programme at the Ross site, DlPd-3, situated on a terrace on the south side of the Oldman River near Coaldale. The excavations were undertaken to determine if the site was sufficiently intact to warrant designation as a Provincial Historical Resource. Two 2 x 2 m units were excavated to about 3.5 m below surface; both yielded extensive cultural remains. At least eight intact components were noted, while a ninth component was defined as a flood deposit. All are assigned to the Old Women's Phase of the Late Prehistoric Period. The components represent camping activities from a variety of seasonal occupations. As a result of the project, the Ross site was designated a Provincial Historical Resource in 1981, and the riverbank was stabilized by Alberta Environment.

ACKNOWLEDGEMENTS

This project could not have been undertaken without the help of many people. The Nickol family of Skull Springs Ranch graciously permitted us to investigate the Ross site and camp by the river, and I thank them for their kind hospitality. Judith Nickol's keen interest in the archaeology of the area was a material aid to the project, as numerous "personal communications" throughout the text will attest. Other citizens of the Coaldale area, particularly Mr. and Mrs. Ed Richards, Mr. and Mrs. Armin Dyck and Mr. and Mrs. Bill Meyers, received us most kindly. I should also like to thank Richard G. Forbis for visiting us in the field and discussing his 1957 excavations.

It is with great pleasure that I acknowledge my fine crew - Dean Wetzel, Donna Whelan, Cathy Luck and Craig Shupe. Their unstinting labour and good spirits ensured the success of the field programme. I was fortunate to retain Cathy's assistance in the laboratory and thank her for preparing the catalogues and radiocarbon samples. I also thank Lynda Gullason and Jon Driver for undertaking the lithic and faunal analyses, respectively.

Janet Tollenaar, Martina Purdon and Lynda Sulderitsch typed various drafts of this manuscript. Martina Purdon edited the manuscript and prepared the publication; her care is most appreciated. Wendy Johnson drafted the figures. Carol Rushworth photographed the artifacts, and Karie Hardie printed the photographs. Their attention to detail is most appreciated, as is their tolerance of my numerous revisions.

It is with pleasure that I thank all for their aid with the Ross Project. Of course, any errors or omissions are solely my responsibility.

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INTRODUCTION

The Ross site (DlPd-3) is a multicomponent, buried campsite located within a low terrace on the south side of the Oldman River, about 15 km northeast of Coaldale in southern Alberta (Figure 1). Here, the river has eroded the terrace edge, exposing a 4.0 m deep section of alluvial deposits. Cultural material is revealed intermittently along 205 m of the cutbank and indicates that as many as six occupations are present. All of these are assigned to the Old Women's Phase of the Late Prehistoric Period (Vickers 1981).

Erosion of the Ross site terrace edge has been extensive. In order to determine if sufficient cultural deposits remained intact to warrant site designation as a Provincial Historical Resource, the Archaeological Survey of Alberta undertook a test excavation programme in 1980 (permit 80-103). This report presents the results of that investigation.

SITE SETTING

The Ross site is located within the grasslands of southern Alberta (Figure 1). The site is on the boundary of the short grass and mixed grass ecoregions as mapped by Strong and Leggat (1981:Map 1). The short grass ecoregion constitutes some 50,000 square kilometres of southern Alberta east of the Ross site. This region has the lowest summer precipitation (May-September mean: 21 cm) and the warmest summer temperatures (July mean: 18.5^{o}C) in the province. The flora, adapted to late summer aridity, is dominated by Grama and Spear grass, but club-moss, sagewort, moss phlox and sedges are common as well (Strong and Leggat 1981:3-7). The mixed grass region, which arcs around the short grass zone, constitutes some 31,000 square kilometres of grassland. It is characterized by increased precipitation (May-September about 5 cm higher) and slightly lower temperatures. The flora is dominated by Spear, Grama and Wheat grass; biomass is estimated to be about 25 percent higher than the short grass ecoregion (Strong and Leggat 1981:7-12). Near the Ross site, both regions have generally shallow snow depths and about 35 chinook days per year.

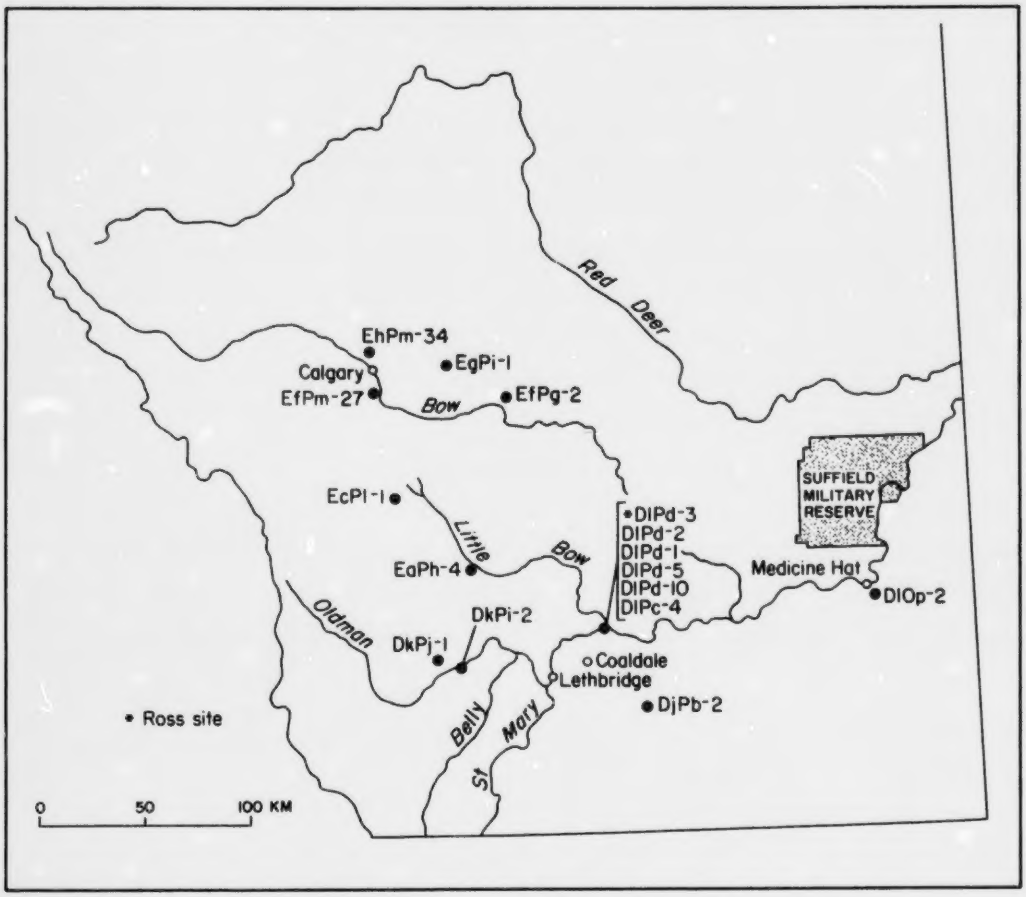

Red Deer
EhPm-34
Calgary
EgPi-1
EfPm-27
Bow
EfPg-2
SUFFIELD MILITARY RESERVE
EcPl-1
Little
Bow
DlPd-3
DlPd-2
DlPd-1
DlPd-5
DlPd-10
DlPc-4
Medicine Hat
DlOp-2
EaPh-4
Oldman
DkPi-2
DkPj-1
Coaldale
Lethbridge
DjPb-2
Ross site
Belly
Mary
St
0
50
100 KM

Figure 1. General location map.

The Ross site is situated on the Oldman River, the southern branch of the South Saskatchewan River system. The Oldman and its major tributaries - the Crowsnest, Castle, Waterton, Belly and St. Mary rivers - rise in the mountains and foothills to the west. From the confluence of the St. Mary River near Lethbridge, the Oldman wends its way circuitously eastward some 90 km to its junction with the Bow River. Throughout this reach, the only tributary of significance is the Little Bow River, a minor stream which enters the Oldman River from the north, just downstream from the Ross site.

Near the Ross site, the Oldman River is incised about 75 m below the prairie surface (Figure 2). The valley is 2 to 4 km wide (at prairie level), and there are about 9 square kilometres of bottom lands at this locale. About 2 square kilometres of woods and brush are present; this includes mature cottonwood as well as scrub. Both up and downstream, the

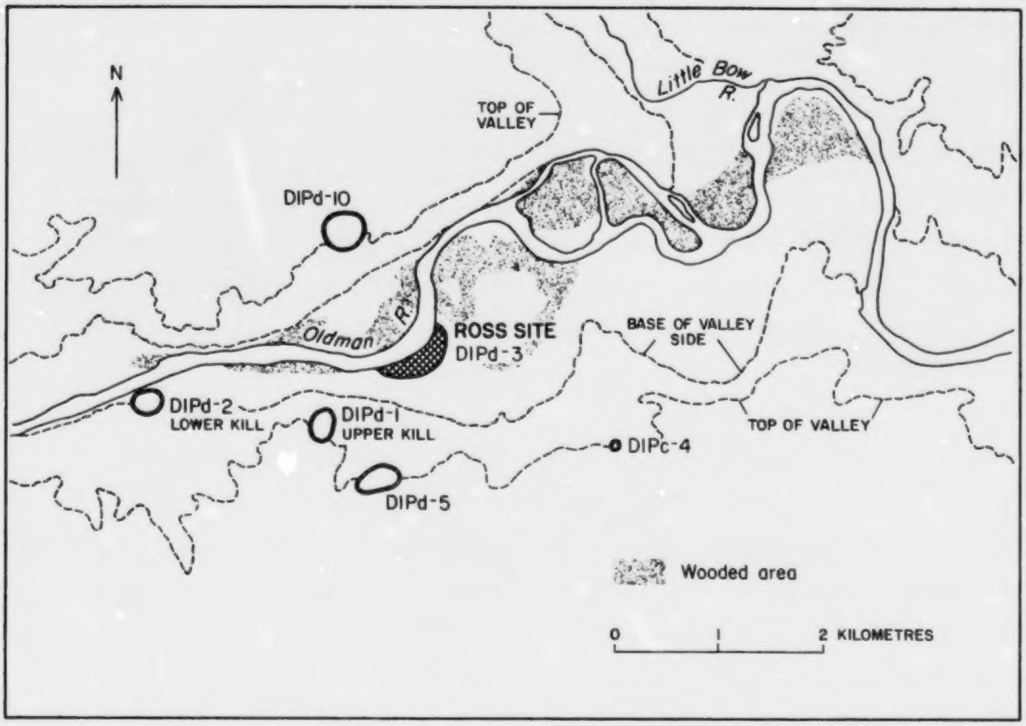

N
Little Bow R.
TOP OF VALLEY
DlPd-10
Oldman R.
ROSS SITE
DlPd-3
BASE OF VALLEY SIDE
DlPd-2
LOWER KILL
DlPd-1
UPPER KILL
TOP OF VALLEY
DlPc-4
DlPd-5
Wooded area
0
1
2 KILOMETRES

Figure 2. Ross site and environs.

valley tends to narrow, and extensive bottom lands are rare. Upstream, wood is rare for over 30 km, while only minor wooded flats occur downstream to Taber. Beyond Taber, wood is generally absent until the confluence with the Bow River at the Grand Forks. Thus, the Ross site locale appears as a pleasant, wooded oasis below the wind swept plains.

The river valley was described by Dawson before extensive Euro-Canadian settlement; his description begins upstream near Diamond City:

> On turning eastward the valley becomes somewhat more confined, and is still nearly as deep as before, but with the banks more gently sloping and grassy, and fewer good sections, to the mouth of the Little Bow. From its first bend below Big Island to within a mile and a half of the Little Bow, there are no trees. The country evidently becomes dryer in this direction, and the low cactus abounds on southward-facing banks. About the mouth of the Little Bow are wide bottoms with some timber and probably a thousand acres of cultivable land.
>
> From the Little Bow to the mouth of the Belly [Oldman; i.e., the Oldman-Bow confluence], there are practically no trees or shrubs, with the exception of those on a few islands.

> The bottom of the valley averages scarcely more than half a mile in width . . . (1884:25; brackets mine).

The prairie around the Ross site locale is quite level and generally bereft of surface water. This is especially true of the lands south of the Oldman River. This area well deserves the annotation appended to Palliser's map of 1863: "Dead level and very arid" (Spry 1968). Palliser, passing through this area in August 1859, had to set a compass course due to the dearth of landmarks; he also noted poor pasturage and only brackish, sulphurous water in the few surface ponds (Spry 1968: 471).

The faunal component of the landscape was, of course, dominated by bison. Perhaps the most comprehensive consideration of Canadian Plains bison ecology is that by Morgan (1979). She reconstructs a seasonal round of bison movement between the foothills in winter and summer pastures to the east. This pattern is consistent with the movements described by Grinnell (1962:234, cited in Morgan 1979:144). While this generalization may be correct, it is unlikely that the actual distribution of bison herds was so simple. In much of southern Alberta, the Chinook winds must have cleared the snow from large areas of rangeland suitable for winter pasture.

Ungulate capability maps provide some data for deer and antelope productivity, although the forage strategies of these mammals differ and are not directly comparable to bison. The prairie level lands near the Ross site are Class 4 and 5 - moderate limitations due to aridity and level topography (Environment Canada 1972). Much of the Oldman valley is Class 3 - moderately high capability - while the area around the Ross site is Class 2W. The latter indicates almost no capability limitations and emphasizes the area as a major wintering zone. This is probably related to the presence of arboreal vegetation for browse. Current deer populations in this area are very high (Judith Nickol, personal communication 1980). In any case, the classification suggests that alternate game sources were readily available near the Ross site, and the area would have been attractive to bison during severe weather (see Arthur 1975).

Forbis has aptly summarized the characteristics of the Ross site locale:

> The general location of the Ross site has a number of advantages for a primitive population, especially during the winter. Frequent chinooks serve to warm the country intermittently during the winter, thus opening the grasslands for the buffalo to graze and be hunted. No doubt the adjacent groves of cottonwoods were an attraction in the winter, providing a source of fuel, as well as shelter. The river was a convenient source of water (1960:121).

Thus, it is apparent that the Ross site locale contained those attributes - wood, water, shelter, game - necessary to a winter habitation site.

PREVIOUS RESEARCH

The Ross site was examined in the spring of 1957 by Richard G. Forbis, and excavations were conducted that summer under the auspices of the Glenbow Foundation (Forbis 1960:119). Forbis noted three cultural horizons, which he designated Layers I, II and III, from bottom to top. The upper layer, Layer III, was described as extensive and well defined, whereas the lower two cultural layers were evident only intermittently (see Byrne 1973:101; Forbis 1960; Wormington and Forbis 1965:138). Forbis, on the basis of depositional rates, estimated Layer III to date to about A.D. 1700 and Layer I to date to A.D. 1400-1500 (Forbis 1960:121, 159). Elsewhere, he suggests a date of A.D. 1500-1700 for Layer III (Forbis 1962:105).

The artifacts recovered during the 1957 field season have been described extensively (Forbis 1960); I have summarized this information in Tables 1, 2 and 3. Excluding some miscellaneous material, the assemblage of about 1,500 artifacts is composed of 49 percent lithic remains, 46 percent ceramics and 5 percent bone and shell items. Of the 731 lithic artifacts, about 40 percent are projectile points and fragments, 26 percent are retouched flakes, 12 percent are bifaces and fragments, and 9 percent are endscrapers. Other types occur in lower frequencies (Table 1). The 699 ceramic sherds are thought to represent only seven vessels (Table 2). The ceramics have been analysed by Byrne (1973:652). All represent the Saskatchewan Basin Complex: Late Variant, and no Cluny Complex material is present (see also Forbis 1960:161; Griffin 1965:227-233).

Table 1. Lithic artifacts from the 1957 Ross site excavations (Forbis 1960:131).

Layer	III	II	I	Total
Projectile points	123	17	35	175
Point fragments	96	11	11	118
Pointed bifaces	9		2	11
U-shaped knife	1			1
Large bifaces	2	1		3
Biface fragments	44	7	18	69
Awls	9	3	1	13
Drill	1			1
Drill points	3			3
Woodland awls	1		3	4
Chisels	7	2	4	13
Bifacially retouched flakes	30	5	10	45
Petrified wood flake knives	39	16	15	70
Endscrapers (all)	35	16	11	62
Ovoid uniface		1		1
Graver		1		1
Spokeshaves	7	2	1	10
Push-planes	7	1	7	15
Uniface fragments	13	2	3	18
Unifacially retouched flakes	46	12	15	73
Choppers (all)	3	6	3	12
Pounders		3		3
Spall scrapers		2	2	4
Anvil	1			1
Shaftsmoothers	1		3	4
Ground stone bead	1			1
Total	479	108	144	731

Table 2. Ceramics from the 1957 Ross site excavations (Forbis 1960:124-125).

Layer	III	II	I	Total
Rim sherds	53	9	3	65
Body Sherds	433	170	31	634
Total	486	179	34	699
Estimated number of vessels	5	1	1	7

Table 3. Bone and shell artifacts from the 1957 Ross site excavations (Forbis 1960:132).

Layer	III	II	I	Total
Bone				
Punches	5		2	7
Splinter awls	1	2	2	5
Metapodial awls		2	2	4
Quill Flatteners		1	2	3
Shaft straighteners		1	1	2
Beads	14	1	2	17
Cut bone	13	10	6	29
Bone tube fragment	1			1
Flaked bone			1	1
Elk incisor	1			1
Shell				
Beads	1	1		2
Pendants	2			2
Total	38	18	18	74

Forbis (1960) undertook a seriation of the projectile points from the Ross site in comparison with specimens from the Upper and Lower kills and the Grassy Lake Cairn. Later, using the types developed at the Old Women's Buffalo Jump, he was able to demonstrate great similarity between Ross Layer III and Old Women's Layers 1-4 (combined) (Forbis 1962:105). Both seriation studies indicate that Layer III is relatively late within the Late Prehistoric Period.

Forbis (1962) interpreted the Ross site as a winter campsite on the basis of site location and ethnographic analogy. Both wood and water were available, while the nearby Lower Kill (DlPd-2) was probably the source for meat products used in the campsite. He suggests, however, that the extensive berry bushes nearby would also have encouraged summer occupation of the Ross site (Forbis 1962:121).

Johnston (1962) reports upon an apparent cache of _Chenopodium_ (either _C. album_ or _C. lanceolatum_) recovered from the Ross site in 1960. The seeds were discovered by local collectors examining the riverbank for artifacts. Apparently, the seeds came from a jar-like, straight-sided cylindrical hole excavated from the Layer III floor. Johnston interprets the discovery to be the germinated remains of a seed cache. Unfortunately, due to the collection circumstances, it is impossible to evaluate this discovery further.

THE 1980 FIELD PROJECT

OBJECTIVES

Erosion of the Ross site terrace has been extensive. The River Engineering Branch of Alberta Environment has estimated that the erosion rate at the site is 0.6-1.5 m per year. Thus, in the 23 year interval between Forbis' work and that of the Archaeological Survey, the riverbank has retreated 14 to 35 m (Figure 3).

Based on Forbis' (1960) work, the Archaeological Survey of Alberta was cognizant of the scientific value of the Ross site. It seemed appropriate to consider designation of the site as a Provincial Historical Resource under Section 16(1) of The Historical Resources Act (Chapter H-8 Revised Statutes of Alberta 1980). The purpose of

Figure 3. View southeast of riverbank erosion at the Ross site.

designation was to prevent all potential impact to the site by cultural or natural processes. The main anticipated impact was that of river erosion, described above.

The objective of the 1980 field project was to determine if sufficient cultural materials remained in the Ross site terrace to warrant site designation. The latter had serious implications vis-à-vis the costs of stabilizing the riverbank to prevent further erosion. Obviously, to justify designation and riverbank stabilization, it was imperative to demonstrate that the Ross site was still worth protecting.

Strategy

The strategy chosen to meet the objective of the project was very simple. First, the riverbank would be examined to determine one dimension of the site. Second, excavations would be conducted inland and perpendicular to the midpoint of the riverbank exposure to provide a second dimension. Examination of the cultural remains in the excavations would allow some impression to be formed of the density and variability of cultural material present. This, in turn, would permit some assessment of the "value" of the site vis-à-vis that established by Forbis.

This approach represented a more practical than scientific solution to the problem. For example, site limits could not be defined, nor could the concept of value be assessed on much more than an intuitive basis. The depth of burial of the cultural horizons precluded excavation of more than two 2 x 2 m excavation units, however, and the evaluation strategy had to be formulated on that basis. The problem of assessing site value is complex (see Bobrowsky 1982; Donahue 1982) and will be discussed further later.

Methodology

Work at the site began with preparation of a site plan using a transit and stadia rod. Nine points (P6 to P14) were located along the cutbank, and 50 cm wide profile cuts were cleaned by trowel to clarify cutbank stratigraphy (Figure 4). Two 2 x 2 m excavation units were laid out perpendicular to the midpoint of the cutbank profile. These were situated at 22-24 m (Unit A) and 48-50 m (Unit B) southeast of point P9 on the cutback (Figure 5).

Excavation was conducted using trowels, and the matrix was sieved through 0.64 cm mesh tripod screens. Excavation was by natural layers. Cultural material was piece plotted, and floor plans and profiles were prepared. Photographic documentation was maintained. All cultural material, with the exception of fire-broken rock (FBR), was bagged and removed to the lab in Edmonton for cleaning and cataloguing. Analysis of the faunal material was conducted by Dr. Jon Driver, Simon Fraser University, on contract (see Appendix 2), and the artifacts were analysed by Ms. Lynda Gullason at the Archaeological Survey of Alberta (see Appendix 1).

Subsequent to the main project, I returned to the Ross site with Bruce Ball, Parklands Archaeologist, Archaeological Survey of Alberta, and Armin Dyck, an amateur archaeologist, to recover a column sample for fine screening. The sample was removed from alongside river cutbank section P9. The sample was collected in 10 cm arbitrary levels, transported to the lab and sieved through a series of fine screens. The results of this project have been reported elsewhere (Bobrowsky and Ball 1982).

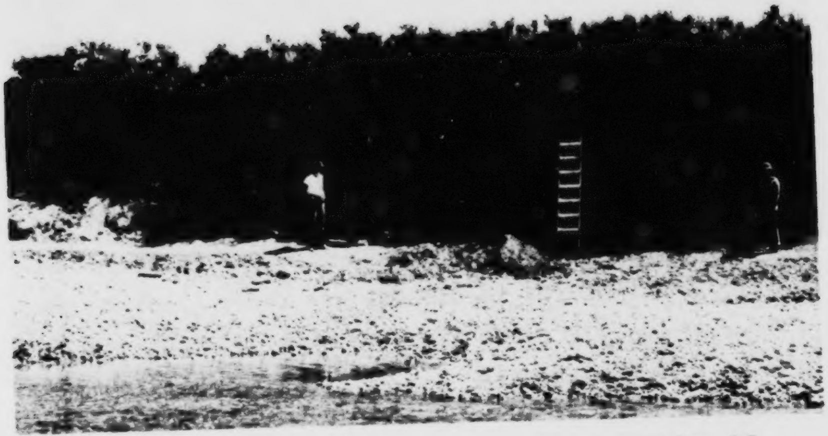


Figure 4. Strata exposed in riverbank at section P6.

STRATIGRAPHY

In 1957, when Forbis first examined the Ross site, he described the exposure:

> Substantial undercutting of the bank exposed three occupation layers containing hearths, faunal remains, and cultural debris. The top layer runs continuously some 670 feet [205 m] along the cutbank; while the lower two layers, not so darkly stained, are intermittent and less extensive. The occupation layers have been numbered - I, II, III - from bottom to top (1960:119; brackets mine).

Forbis (1960:121) further noted that about 1.2 m of unconsolidated, stratified sands and gravels capped Layer III in his excavation area. This suggested a high energy depositional regime, and Forbis (1960) remarked, "Any cultural remains which may have been lying in the path of the flood could hardly have withstood the impact and would have been washed away." Layer III and all deposits below were composed of sand, silt and clay, indicating a low energy depositional environment with little or no disturbance of the cultural debris during burial.

1980 Riverbank Stratigraphy

Upon examining the river cutbank in 1980, it became apparent that Forbis' description could be improved but little. Cultural Layer III was

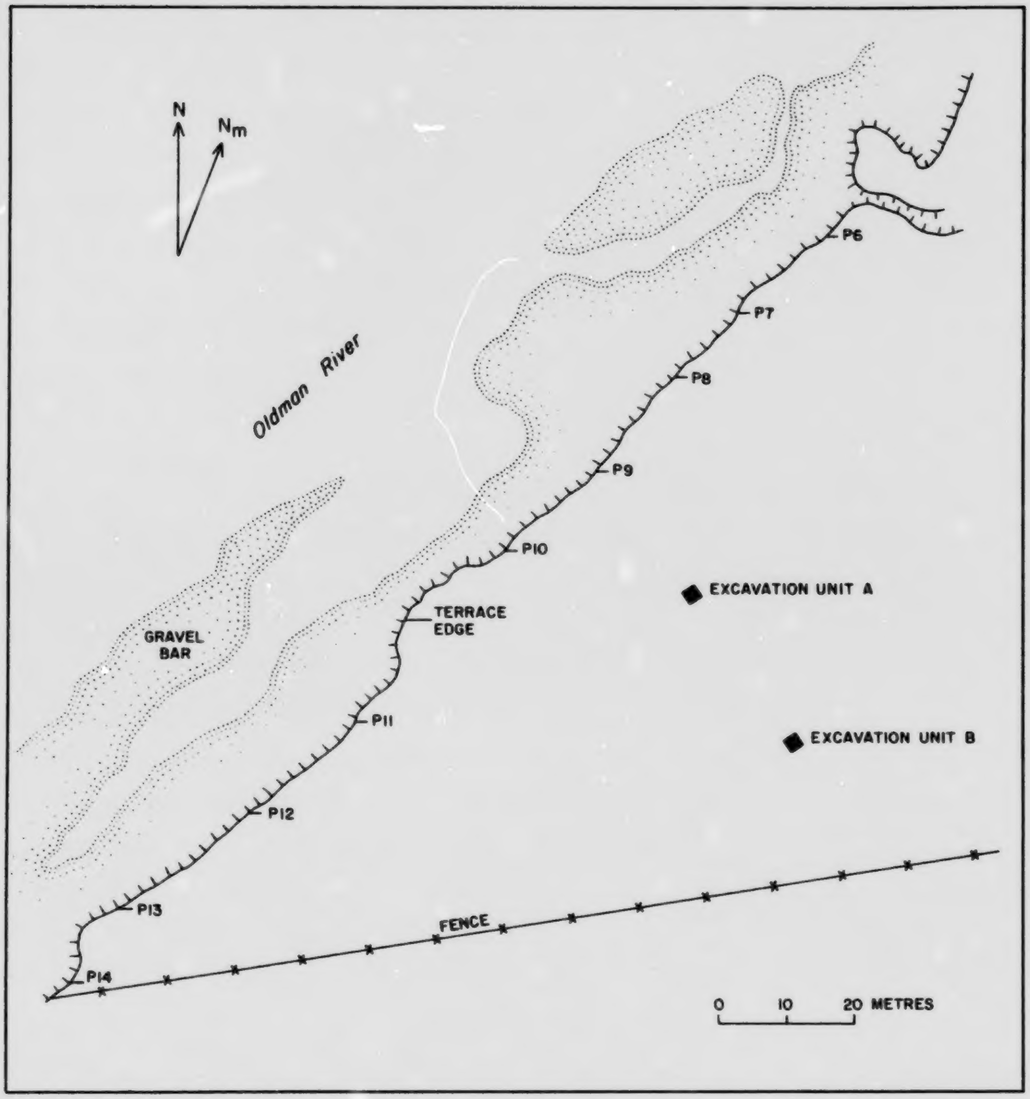

N
Nm
Oldman River
GRAVEL BAR
TERRACE EDGE
P6
P7
P8
P9
P10
P11
P12
P13
P14
EXCAVATION UNIT A
EXCAVATION UNIT B
FENCE
0
10
20 METRES

Figure 5. Site excavation plan.

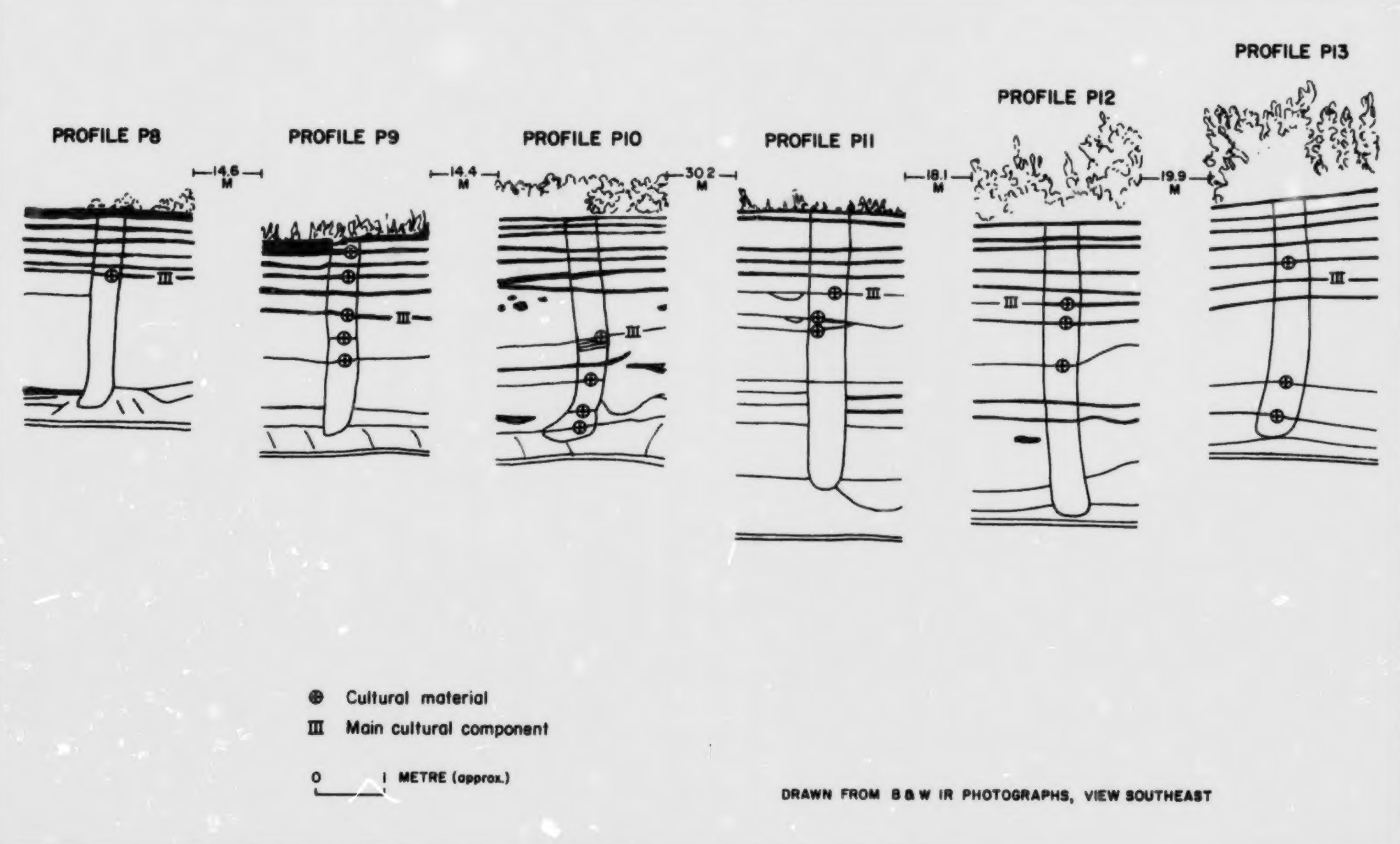
evident and could be traced most of the way along the bank. Intermittent exposure of other cultural material, mainly bone, did suggest that more than three cultural layers were present. However, weathering and slumping obscured the strata, so nine 50 cm wide sections were cleaned and profiled along the cutbank. As well, back and white infrared photographs were taken of the cutbank in the hope that layer contrast would be enhanced; this was not very successful.

The natural stratigraphy as exposed in the cutbank is very complex. For example, the unconsolidated stratified sands and gravels noted by Forbis are still visible in profile P10, the general location of the 1957 excavations (Richard G. Forbis, personal communication 1980). In profile P11, about 30 m southwest, this layer was composed of sand with some pebble inclusions. At profile P12, a further 20 m southwest, this part of the profile is composed of thin, alternating sand/silt layers. Thus, it is not possible to correlate with any certainty the matrix and depositional event represented by the P10 sands and gravels across the river cutbank profile. This problem existed for virtually all the natural stratigraphy; the depositional matrix is simply too complex and obscured to trace along 200 m of weathered cutbank surface.

The main cultural layer, Layer III, could be traced along the cutbank. The layer could be identified in every section except profile P6; the layer dips markedly towards the northeast in profile P7 and disappears. The angle of Layer III in profile P7 suggests that the ground surface at the time may have been at the edge of a meander channel. As in 1957, Layer III is a well-defined, black zone with hearths, faunal remains and cultural debris present in quantity. This allows the layer to be traced despite changes in the depositional matrix.

Cultural material is exposed in the cutbank both above and below Layer III; however, these cultural layers are much more poorly defined and cannot be traced along the full cutbank. The riverbank profiles, drawn from black and white infrared photographs, indicate the difficulty of tracing the cultural layers (Figure 6). The joining and bifurcations of strata are partly a function of slumping and weathering. However, it is apparent that at least two occupations are present above Layer III, and a further three occupations are present below that layer.

Little cultural material was seen northeast of profile P6, although sporadic finds have been noted there (Judith Nickol, personal communication 1980). In 1980, I saw occasional bone fragments in this area, but they did not appear to represent occupation horizons; more likely, they were simply washed-in. Southwest of profile P14, the cutbank is more obscured by slumping. Although the site form for DlPd-6 indicates that scattered artifacts occur southwest of the Ross site, examination of the occasional exposure, the slump blocks and the beach


PROFILE P8
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PROFILE P9
14.4 M
PROFILE P10
30.2 M
PROFILE P11
18.1 M
PROFILE P12
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III
⊕ Cultural material
III Main cultural component
0 1 METRE (approx.)
DRAWN FROM B&W IR PHOTOGRAPHS, VIEW SOUTHEAST

Figure 6. Strata and cultural material at selected locales along the river cutbank.

failed to reveal much cultural material. The limits of the site thus defined are consistent with the site limits defined by Forbis in 1957 (Richard G. Forbis, personal communication 1980).

1980 Excavation Unit Stratigraphy

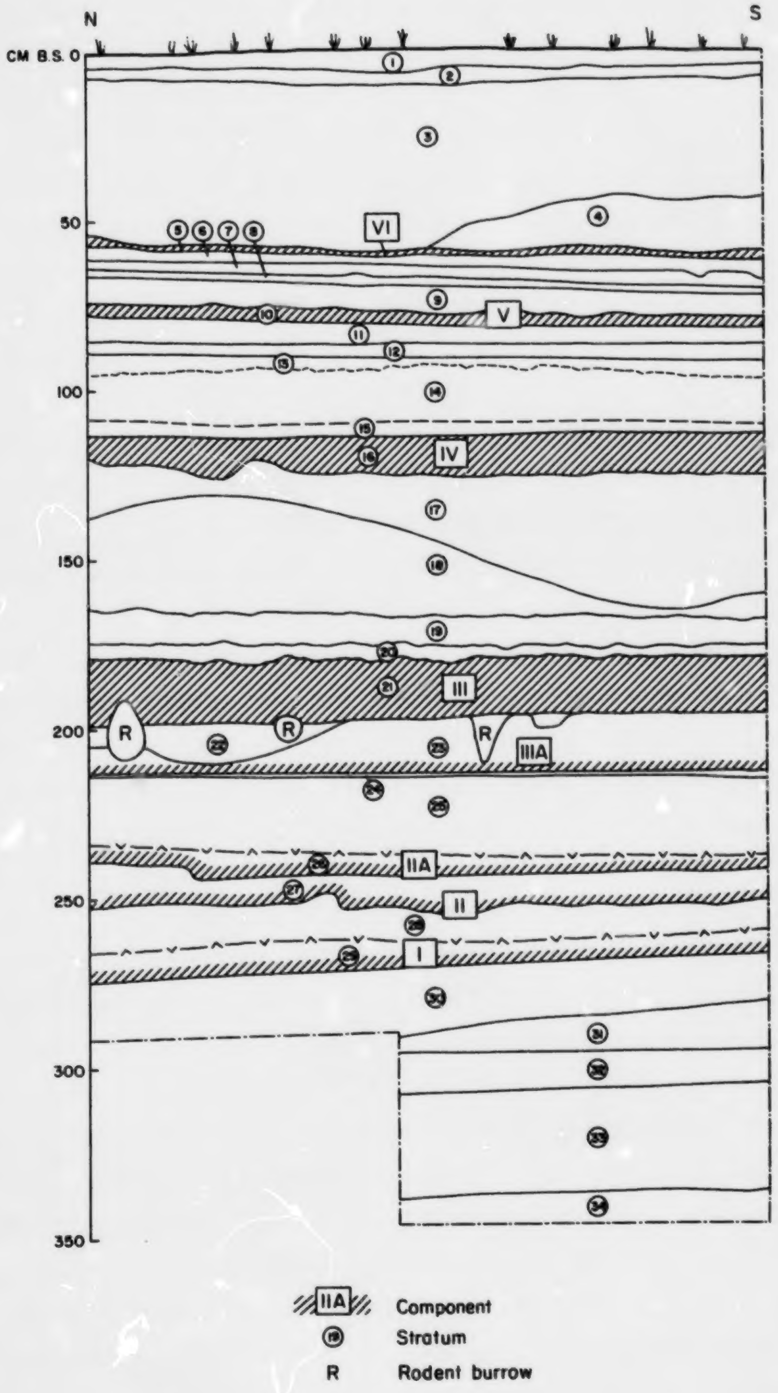
The natural stratigraphy exposed in the 1980 excavation units is illustrated in Figures 7, 8 and 9 and described in Tables 4 and 5. As with the river bank profiles, there are problems correlating the natural stratigraphic layers between the excavation units. For this reason, I have numbered and described the strata separately for each excavation unit.

Although the two excavation units are separated by 24 m, and the stratigraphy is complex, it was necessary to attempt to correlate the layers. I have superimposed the cultural layers onto the profiles and indicated my interpretation of the stratigraphic sequence (Figure 10). Component III is recognizable throughout the site and is the key layer in this correlation. Since it occurs at approximately the same depth below surface in both units and is underlain by four earlier components in each, I am certain of its identification. The four earliest components can also be correlated between units by a simple "finger-matching" argument, but correlation of the components above Component III is more difficult.

The first stratum present in both units occurs about 3.0 m below surface; it appears as a clay and silt layer in Unit A and as a silt layer in Unit B (XUA:31 = XUB:33). Above is a similar stratum (XUA:30 = XUB:32). The interface between the strata is visible as a dark stain.

Component I occurs on the surface of these layers (XUA:30 and XUB:32) with the cultural material encased in a clay and silt matrix (XUA:29 = XUB:31). The matrix becomes increasingly silty above and attains a varved or banded appearance in Unit A (XUA:28 = XUB:30). Component II is situated on the surface of these layers.

Component II cultural material is encased by sand in Unit A (XUA:27) and by silt in Unit B (XUB:29); the cultural material is in the lower portions of these layers. In Unit B, sand increases in the upper portion (XUA:27 = XUB:29 & 28). Component IIA is present on the surface of these layers.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IIA Component
⑲ Stratum
R Rodent burrow

Figure 7. East wall profile, Unit A.

Table 4. Stratigraphic notes for east profile of Unit A (see Figure 7).

Stratum	Notes
1	Grey silt with roots; little dark staining and probably recently deposited. Thickness = 6 cm.
2	Grey silty sand, somewhat coarser than #1; slight blackish stain with many decayed rootlets between #1 and #2. Thickness = 4 cm.
3	Unsorted sands and gravels, no cobble-sized stones. Thickness = 40-50 cm.
4	Bedded coarse sand lens; possibly truncated by #3. Thickness = 15 cm.
5	Brown-grey silt. Thickness = 2 cm. Cultural Component VI.
6	Brown sand and fine (sub pea) gravel. Thickness = 4 cm.
7	Silt and very fine sand. Thickness = 4 cm.
8	Sandy silt with rootlets; dark staining; probably old Ah. Thickness = 2-3 cm.
9	Brown sandy silt with decayed rootlets. Thickness = 7 cm.
10	Grey silt and clay with mottled red stain. Thickness = 5 cm. Cultural Component V at base of stratum.
11	Compact grey clay; hearth stain on upper surface. Thickness = 6 cm.
12	Brown sand. Thickness = 3 cm
13	Grey clay; grades to #14. Thickness = 3-6 cm.
14	Fine silty sand, bedded; grades to #13 and #15. Thickness = 16 cm.
15	Fine silty sand, mottled; grades to #14. Thickness = 5 cm.
16	Brown-grey clay with discontinuous sand and silt lenses. Thickness = 6-12 cm. Cultural Component IV.
17	Brown sand, medium to coarse. Thickness varies from 5 to 40 cm.
18	Fine yellow-grey sand with red staining. Thickness varies from 3 to 35 cm. Probably related to #17.

Table 4. continued.

Stratum	Notes
19	Grey silt; red stains around decayed rootlets. Note that there appears to be a concentration of clay at the interface with #18 and with #19. Thickness = 8-10 cm.
20	Mottled yellow sand with some silt and clay inclusions. Thickness = 4 cm.
21	Grey silt with some clay and sand inclusions and charcoal flecks. Thickness = 16 cm. Cultural Component III at base of level with most cultural material within #21 matrix. Rodent disturbance present in #21 and #23 matrix.
22	Sand lens, discontinued between #21 and #23, more evident on west wall. Thickness = 0-11 cm.
23	Grey silt with red stains. Thickness = 16 cm. Upper surface is floor of Cultural Component III.
24	Silt with sand and clay inclusions, mottled grey and black. Thickness = 2 cm. Cultural Component IIIA on surface with cultural material protruding into #23.
25	Grey silt with sand inclusions, some suggestion of bedding. Thickness = 23 cm. Grades to #26.
26	Grey silt and clay with red stains. Thickness = 6 cm. Grades to #25. Cultural Component IIA at base (surface of #27) with cultural material protruding into this stratum.
27	Medium to fine brown sand. Thickness = 8 cm. Cultural Component IIA on surface, Cultural Component II at base with cultural material protruding into this stratum.
28	Alternating bands of yellow silt and grey clay, about 3 layers per cm, carved appearance. Thickness = 10 cm. Cultural Component II on surface.
29	Grey clay and yellow silt, mottled, charcoal flecks, grades to #28. Thickness = 7 cm. Cultural Component I at base, cultural material protrudes into this stratum.
30	Grey clay and yellow silt, mottled red and grey at base. Thickness = 20 cm. Interface between #30 and #29 is stained black, but this does not extend into #30.
31	Grey clay and yellow silt; rodent disturbance. Thickness = 5-15 cm. Mottled red and grey staining at interface with #32.

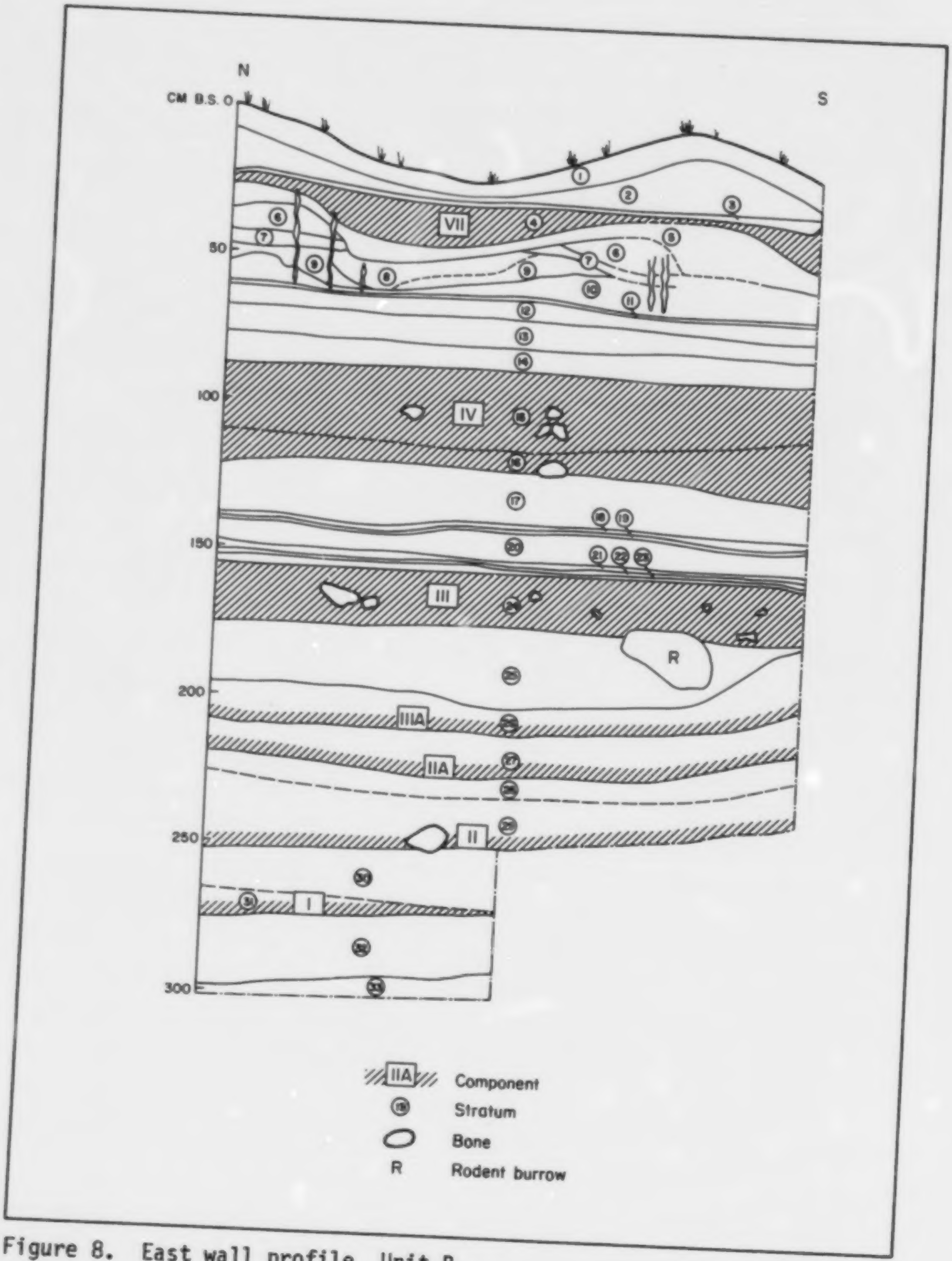
Table 4. continued.

Stratum	Notes
32	Grey clay and yellow silt; reddish staining at interface with #33. Thickness = 11 cm.
33	Grey clay and yellow silt, many shell inclusions (snail); dark stain at interface with #34. Thickness = 30 cm.
34	Grey clay and yellow silt. Thickness = +9 cm. Excavation unit terminated.

The cultural material designated Component IIA is encased in the lower portions of a silt and clay layer (XUA:26), which grades to a silt layer with some sand inclusions in Unit A (XUA:25). This is equivalent to a silt layer in Unit B (XUA:26 & 25 = XUB:27). In Unit A, increasing clay and dark staining allowed definition of another layer (XUA:24), which is represented by dark staining at the top of the Unit B silt layer (XUB:27). Component IIIA is situated on the surface of these layers.

The cultural material of Component IIIA is enclosed in the lower part of a silt layer (XUA:23 = XUB:26). This is capped by a thick sand layer in Unit B (XUB:25). This is equivalent to a sand lens on the east wall profile of Unit A (XUA:22 = XUB:25); on the south wall of that unit, the sand forms a continuous layer. The main cultural stratum, Component III, occurs within a clay-silt-sand layer above (XUA:21 = XUB:24). A dark stain (Ah soil horizon) is prominent on the layer in Unit B (XUB:23).

The Component III cultural material is distributed throughout the matrix (XUA:21, XUB:24 & 23) and, unlike the lower components, does not lie on the surface or interface. The development of a soil, especially visible in Unit B (XUB:23) suggests some depositional stability after the site was abandoned. The cultural layer is capped by a thin sand layer in both units (XUA:20 = XUB:22). Above, in Unit A, is a silt layer with clays concentrated at the upper and lower interfaces (XUA:19). These appear as separate clay layers in Unit B (XUB:21, 19) above and below the silts (XUB:20). A further thin silt layer is present in Unit B (XUB:18) but not in the other unit. Above is a fine sand, and fine sand and silt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IIA Component
19 Stratum
Bone
R Rodent burrow

Figure 8. East wall profile, Unit B.

Table 5. Stratigraphic notes for east profile of Unit B (see Figure 8).

Stratum	Notes
1	Grey silt with roots, some sod development. Thickness = 5-10 cm.
2	Grey silt and sand, some suggestion of bedding. Thickness = 2-19 cm.
3	Silt, stained black (Ah), rootlets. Thickness = 2 cm.
4	Sand and gravel. Thickness = 1-15 cm. Bone in matrix; designated as Cultural Component VII.
5	Bedded sands, grades to #4. Thickness = 4-18 cm.
6	Grey silt lenses. Thickness = 10 cm.
7	Silt and sand lenses. Thickness = 5 cm.
8	Gravel. Thickness = 8 cm.
9	Sand lenses. Thickness = 0-10 cm.
10	Grey silt with some sand. Thickness = 2-14 cm.
11	Silt, black-stained (Ah). Thickness = 3 cm.
12	Grey silt, same matrix as #11. Thickness = 6 cm.
13	Grey silt and clay. Thickness = 9 cm.
14	Grey silt. Thickness = 7 cm.
15	Gravel and sand, grades to #16. Thickness = 28 cm. Bone recovered from #15 and #16 has been designated Cultural Component IV.
16	Brown sand, grades to #15. Thickness = 5-20 cm. Bone from #16 and #15 designated Cultural Component IV.
17	Grey silt and fine brown sand. Thickness = 18 cm.
18	Grey silt. Thickness = 2 cm.
19	White-grey clay. Thickness = 2 cm.
20	Grey silt. Thickness = 9 cm.
21	White-grey clay. Thickness = 2 cm.

Table 5. continued.

Stratum	Notes
22	Brown sand. Thickness = 2 cm.
23	Silt, black stained (Ah). Thickness = 2 cm.
24	Grey silt with sand and clay giving an "banded" appearance. Thickness = 16 cm. Cultural Component III.
25	Brown sand. Thickness = 28 cm. maximum, but very irregular along south wall of excavation unit. Both #24 and #25 show some rodent disturbance.
26	Grey silt. Thickness = 8-20 cm. Cultural Component IIIA.
27	Grey silt. Black stain (Ah) at surface of #27 is base for Cultural Component IIIA. Cultural Component IIA on surface of #28 with material protruding into #27. Thickness = 13 cm.
28	Banded grey and yellow silt with some sand. Black stain (Ah) at surface. Grades to #29. Thickness = 6 cm.
29	Yellow silt, grades to #28. Thickness = 12-26 cm. Cultural Component II on surface of #30 and cultural material protrudes into #29.
30	Yellow silt and grey clay, black stained (Ah?) on surface. Thickness = 13-20 cm. Grades to #31.
31	Grey clay. Thickness 2 - 9 cm. Cultural Component I at interface of #31 and #32 with material protruding into #31.
32	Yellow silt. Thickness = 20 cm. Dark stain at interface with #31 and #33.
33	Yellow silt. Thickness = +7 cm. Excavation unit terminated.

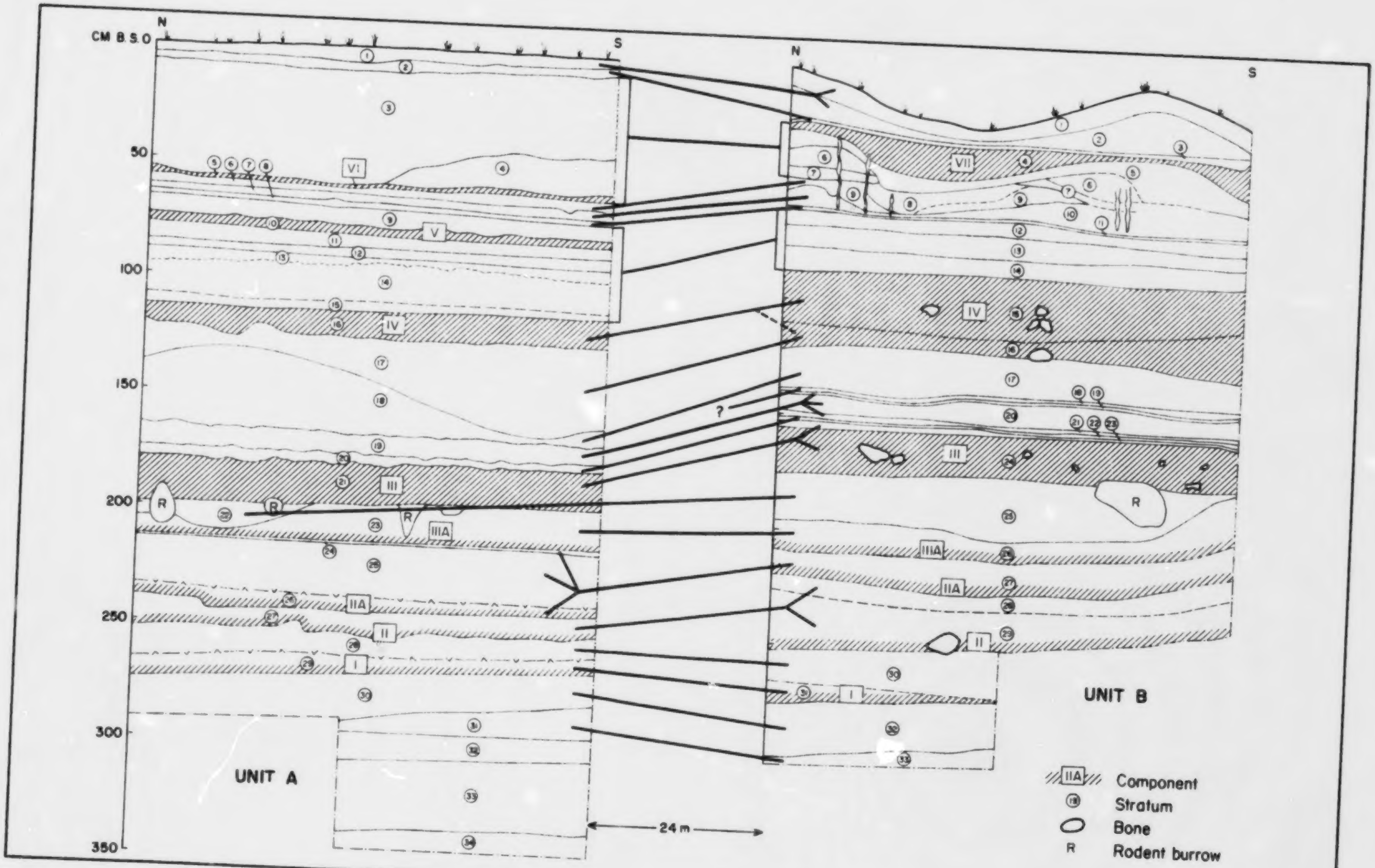
Figure 9. View north of profile, Unit B.

layer (XUA:18=XUB:17). In both units, this is capped by a coarse sand layer (XUA:17=XUB:16).

In Unit A, Component IV occurs within a clay layer containing sand and silt lenses (XUA:16). In Unit B, the cultural material is mixed in a sand and gravel layer (XUB:15); pockets of cultural material and gravel protrude into the coarse sand layer below (XUB:16). Presumably, the event which deposited the clay layer in Unit A was sufficiently turbulent in the Unit B area to scour the sands and leave the cultural material jumbled in the gravels.

Above Component IV (XUA:16, XUB:15 & 16), specific strata between the units cannot be correlated with confidence. However, a dark soil horizon is present in both units at a higher level; I assume this represents the same event (XUA:8 = XUB:11). If so, the general picture suggests that seven layers identified in Unit A are equivalent to three layers in Unit B (XUA:15, 14, 13, 12, 11, 10, 9 = XUB:14, 13, 12). One of the Unit A layers (XUA:10) contains Component V within a silt and clay matrix; no cultural material was noted within this portion of the Unit B profile.

Above the dark stained soil horizon (XUA:8 = XUB:11) is a layer of silt and fine sand (XUA:7 = XUB:10). This is capped by a layer of sand and fine gravel in Unit A, and a sand pocket in Unit B (XUA:6 = XUB:9). Above, a silt layer (XUA:5) in Unit A contains Component VI. This layer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R Rodent burrow

Figure 10. Correlation of excavation unit strata.

has been disturbed, probably by a flooding event which left a pocket of coarse sand (XUA:4) and a 50 cm thick gravel stratum (XUA:3) in the profile.

In Unit B, above the sand pocket (XUB:9), are a gravel lens (XUB:8), a silt and sand lens (XUB:7), a silt lens (XUB:6), a sand layer (XUB:5) and a layer of sand and gravel (XUB:4) which contains cultural material. This layer has been designated Component VII. This component represents a flooding event which deposited cultural material within the gravels. The cultural material could represent Component VI debris scoured off the site but not necessarily, hence the new component designation. In general, three strata identified in Unit A appear to be equivalent to five Unit B layers (XUA:5, 4, 3 = XUB:8, 7, 6, 5, 4).

Above, in Unit A, there is a darkly stained, silty, sand layer, while a darkly stained, silt layer is present in Unit B (XUA:2 = XUB:3). This is capped by a silt layer in Unit A and by a silt and sand, and a silt layer in Unit B (XUA:1 = XUB:2 & 1). These layers contain rootlets of the modern vegetation growing on the site surface.

Correlation of 1957 and 1980 Stratigraphy

When Forbis excavated at the Ross site in 1957, he noted three cultural layers which he designated Layer I, II and III, from bottom to top. In 1980, I noted nine layers containing cultural material which I have designated Components. In this section, I will discuss the correlation of the cultural stratigraphy between projects.

Forbis' (1960:119) main cultural layer, Layer III, is extensive and very well defined. As noted previously, it is the only layer so distinctive as to be traced readily along the cutbank. Similarly, the layer is easily identified in the excavation unit profiles. In keeping with Forbis, I have designated this Component III. While I am confident that Forbis' Layer III and my Component III are identical, I am much less certain about the identification of Layers I and II.

Forbis recovered about 64 percent of his assemblage from Layer III, 16 percent from Layer II, and 20 percent from Layer I. I recovered about 61 percent of my assemblage from Component III and about 16 percent from the lowest cultural layer. However, between Component III and the lowest layer, I have three cultural horizons, none of which produced more than

3 percent of the assemblage. Thus, the relative frequency of material recovered in 1980 will not serve to correlate the lower cultural stratigraphy with Forbis' layers.

In the end, it was necessary to assume that the lowest cultural horizon encountered in 1980 equates with the lowest one discovered in 1957; thus, Forbis' Layer I is equated with my Component I. Next to Component III, Component I was the highest yielding cultural layer encountered in 1980. The three cultural horizons between Components I and III have been simply designated Components II, IIA and IIIA, from bottom to top. Which of the latter equates to Forbis' Layer II is not known.

COMPONENT DESCRIPTIONS

Summary descriptions of each cultural component are presented below. The components are described separately for each excavation unit. Stratigraphic data, dating, artifacts and faunal remains are described briefly, and an interpretation of each unit component is offered. Detailed artifact and faunal data are presented in the appendices. A key to artifacts and faunal remains illustrated on the floor plans is presented in Table 6.

Component I

The lowest component at the Ross site was designated Layer I by Forbis (1960:119) and is named Component I here. This cultural layer is exposed intermittently in the river cutbank. In the excavation units, the component was encountered about 2.75 m below surface. Based on the description by Forbis (1960), the stratigraphic position in the excavation units and the material culture remains, correlation of Component I with Forbis' Layer I is reasonable.

Excavation Unit A

The floor of Component I in Unit A was defined primarily by charcoal flecks and a slight dark staining of the silt and clay matrix. The staining probably resulted from increased organics of cultural origin. It seems probable that this surface was quickly covered by sediments; the

Table 6. Floor plan artifact and fauna key.

ARTIFACTS

Artifacts are illustrated by a type symbol followed by a lithic letter code.

▲ - Projectile Point
● - Biface
■ - Endscraper
□ - Uniface
○ - Tool Fragment

△
- Marginally retouched flake
- Marginally retouched shatter
- Utilized flake
- Utilized shatter

○
- Thinning flake
- Biface thinning flake
- Retouch flake

□
- Core, core fragment
- Core shatter
- Bipolar split pebble

□
- Platform preparation flake
- Primary decortication flake
- Secondary decortication flake
- Secondary flake
- Flake fragment
- Shatter

▨ - Fire-broken rock
rs - Rim sherd
bs - Body sherd

PC - Pebble Chert
SRC - Swan River Chert
PW - Petrified Wood
SM - Silicified Mudstone
SS - Silicified Siltstone
Qz - Quartz
L - Limestone
Ch - Chalcedony
MC - Montana Chert
RBC - Red-brown Chert
WC - Milky White Chert
BrC - Brown Chert
AC - Avon Chert
GC - Grey Chert
BC - Black Chert
LBC - Light Brown Chert
Z - Obsidian
A - Argillite
CA - Chert Grade Argillite
P - Porcelainite
Q - Quartzite
AS - Argilliceous Sandstone
S - Sandstone
I - Ironstone

Table 6. continued.

FAUNA

Faunal elements are illustrated and identified by a circled number. Elements are indicated only for those specimens identified to species. Unless otherwise indicated, identified elements are bison or canid (stippled).

① - Skull
② - Mandible
③ - Teeth (loose)
④ - Vertebrae
(4a) - Atlas, Axis
(4c) - Cervical (C4-C6)
(4t) - Thoracic
(4l) - Lumbar
⑤ - Ribs
⑥ - Scapula
⑦ - Humerus
⑧ - Radius, Ulna
⑨ - Carpals
⑩ - Metacarpals
⑪ - Phalanges, Sesamoids
⑫ - Pelvis
⑬ - Femur
⑭ - Patella
⑮ - Tibia, Fibula
⑯ - Tarsals
⑰ - Metatarsals

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level is very low vis-à-vis the river, and no true Ah horizon appears to be present. The occupation floor is relatively level with about a 4 cm dip towards the north and west. The floor in this unit appears to be undisturbed. The capping clays and silts suggest that the floor was sealed in a low energy environment. The only disturbance noted was a rodent burrow which protruded about 20 cm into the unit along the east wall. Material culture remains from the burrow fill - Swan River chert flake (1) and shatter (9), brown chert shatter (2) and obsidian shatter (1) - are not included in the component analysis.

Dating

Insufficient charcoal was obtained from this level to secure a radiocarbon date. A projectile point base fragment from the unit is classifiable as Plains Side-notched (Kehoe 1966), thought to postdate about A.D. 1400. The point is probably a Pekisko type in Forbis' (1962) Old Women's sequence, but this classification is less certain since notch width can only be estimated due to the breakage. Pekisko points are considered to have appeared about A.D. 1200 and increased in popularity until replacement at the end of the Protohistoric Period by European manufactures (Forbis 1962:98). A potsherd from the excavation unit floor may be classifiable as Thick Smooth in Byrne's (1973:160) classification. In summary, the data from Unit A permit assignment of Component I to the Old Women's Phase of the Late Prehistoric Period (Reeves 1969; Vickers 1986a) but are insufficient to estimate actual age.

Artifacts

A total of 81 lithic artifacts and one potsherd was recovered from Unit A Component I (see Appendix I). The potsherd is a very small body fragment with much of the exterior surface missing. It might be Thick Smooth, but classification is difficult.

Three specimens of ochre were recovered from the occupation floor. One is a lump of limonite, while the other two are small samples of hematite.

Lithic artifacts are summarized in Table 7. Only one finished tool is present: a side-notched projectile point base which is broken between the notches. It appears to have snapped due to lateral pressure against one face.

Shatter dominates the artifact assemblage (66%). A large, somewhat silicified sandstone cobble was tested in the occupation. Many of the core shatter and shatter fragments from this cobble cross mend. Some shatter (quartz, mudstone, pebble chert and brown chert) is relatively large (about 3-5 cm maximum length), but most of the assemblage of shatter and flakes consists of very small fragments (less than 1 cm maximum length). This suggests that it was generated from the production or resharpening of cutting edges rather than basic tool production.

About 80 percent of the lithic materials probably are of local origin. Of these, Swan River Chert is most common. All other local lithic materials, except for the sandstone cobble fragments noted earlier, are minimally represented. Obsidian forms about 13 percent of the lithic assemblage, although all of the specimens are very small. In general, the exotic lithic materials indicate ties to the Montana and Wyoming quarries to the south.

Table 7. Lithic artifacts, Unit A - Component I.

	Pebble Chert	Swan River Chert	Petrified Wood	Silicified Mudstone	Quartz	Limestone	Chalcedony	Montana Chert	Brown Chert	Obsidian	Argilliceous Chert	Quartzite	Sandstone	Total
Projectile point		1												1
Core Shatter		1											7	8
Shatter	3	27	2	1	1				1	5	1	3	10	54
Flake Fragment										1				1
Secondary Flake		2										1		3
Thinning Flake		1						1		1				3
Retouch Flake		3	1				1			4	1			10
Broken Pebble						1								1
Total	3	35	3	1	1	1	1	1	1	11	2	4	17	81

Faunal Remains

A total of 152 bones was recovered from Unit A Component I (see Appendix II). Of these, 34 were identified as buffalo and 53 as coyote. The bison is represented primarily by appendicular elements, including an articulated lower forelimb. Much of this material was fractured for marrow extraction. The bison skull was opened for brain removal; interestingly, this was done from the base of the skull.

The canid remains have been identified as coyote. The elements, except for one tarsal, are all axial. A complete skull, exhibiting skinning marks, and ribs dominate the remains. A number of cervical vertebrae were found in articulation.

As well as the utilized faunal material, one snail shell was recovered from the level. Identified as Discus cronkhitei, it is a local pulmonate land snail. Its presence is probably fortuitous, since escargot consumption in southern Alberta is a phenomenon of recent vintage.

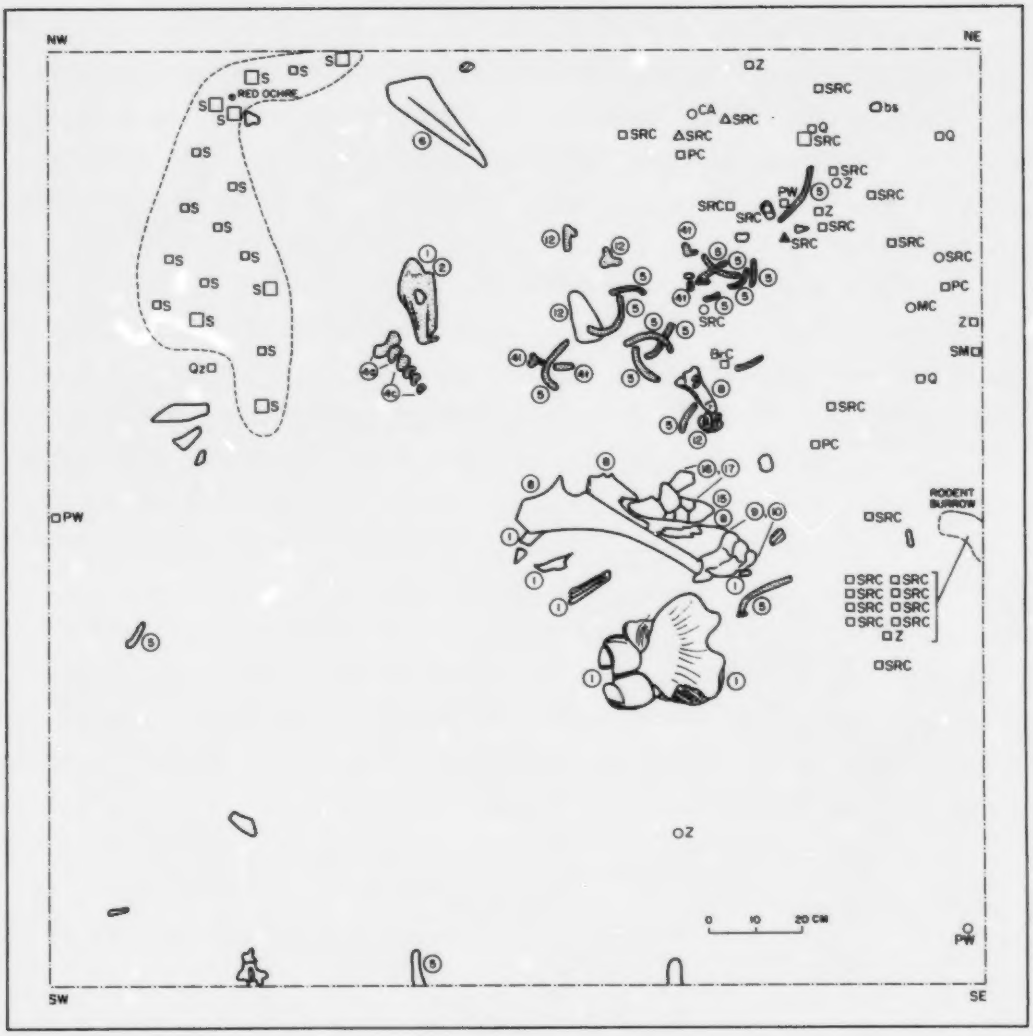
Interpretation

Excavation Unit A appears to have penetrated a minor working area of the Component I campsite. Guessing from the floor plans, this area extends north of the excavation unit (Figure 11). Judging from the scatter of large bone elements, this working area probably was external to a habitation.

The bison bone, concentrated in the central part of the unit floor, was broken for marrow and brain extraction. Although no tools large enough for this purpose were present on the exposed floor, the articulating limb segments and bone fragments suggest that, after meat stripping, the bone was broken for marrow removal and probably discarded at the working locale. The joint soft tissue holding the elements in anatomical position was obviously still present. Similarly, the skull fragments around the bison skull suggest that brain extraction also occurred on the unit floor. I should note that the skull and forelimb are probably from different animals; the forelimb appears to be from a more mature individual (Tim Schowalter, personal communication 1983). Presumably the former animal was killed near the Ross site, since the rather heavy skull was brought into camp.

The concentration of coyote bone in the north half of the unit floor suggests that the carcass was butchered in that area. The atlas, axis and C4 to C6 were in found articulation near the complete skull of the animal. The ribs and a couple of pelvic fragments are in close association if not anatomical position. Presumably, the animal was skinned, the head and neck severed and the forelimbs, including scapulae, and hind limbs removed. The appendicular elements might have been taken for bead production; Forbis (1960:156) recovered beads from all layers at the Ross site.

A concentration of sandstone shatter occurs in the northwest corner of the unit. Judging from colour variation on the cortex, the cobble had been exposed to fire; however, it is not possible to say whether this was an attempt at heat treating or simply fortuitous. The complete cobble is not present in the unit; presumably some flakes were adequate for use elsewhere. While the sandstone is somewhat silicified, it would hardly have been a preferred lithic.


NW
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RED OCHRE
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Figure 11. Floor plan, Unit A - Component I.

The rest of the lithic artifacts are scattered mainly north and east of the coyote and bison bone. Most of this material is shatter and flakes. I suspect much of it was produced through maintenance of simple tools used during skinning and meat stripping of the carcass.

Excavation Unit B

Component I in Unit B is similar to that in Unit A; correlation of the cultural level between excavation units presents no problems. The floor is capped with clay deposited in a low energy environment and appears to have been undisturbed by that event. Only the north half (1 x 2 m) of the excavation unit was opened to this depth.

Dating

No temporally diagnostic artifacts were recovered from this level. A carbon sample was taken from charcoal scattered over the floor. The matrix contained sand and ash. The sample matrix weighed over 100 g before cleaning. After cleaning, the submitted sample weighed only 5.03 g. It returned a date "younger than 100 years B.P." (S-2040). This date is rejected.

Artifacts

A single biface thinning flake fragment of grey chert was recovered (Appendix I). As well, four large fragments of fire-broken rock were noted. A bone tool is present; it is a large mammal (bison) rib fragment with one end rounded. Cancelous tissue is exposed but no polishing is evident.

Faunal Remains

A total of 544 bones was recovered from Component I, Unit B. Of these, 75 were identified as buffalo, one as coyote, and one as deer (Appendix II). Much of the assemblage is broken, large mammal bone. Some of the latter is burned and calcined.

Interpretation

Component I in Unit B is quite different from that in Unit A. Only a single biface thinning flake is present; the rest of the material is bone. While no features are present, a rather amorphous concentration of ash and charcoal flecks appears to be in association with many of the bone fragments in the east half of the unit floor (Figure 12). This scatter lacks depth; that is, it appears to be a surficial scatter of material on the occupation surface. This, and the scattered, fire-broken rock, suggest that a hearth is located near the north unit wall. My impression is that the occupation floor intercepted by Unit B is a refuse disposal area for a meat and bone grease processing activity area nearby.

Component II

Component II was encountered about 2.50 m below surface in both excavation units. There is no difficulty correlating the component floors between the units; however, as discussed earlier, correlation with Forbis' (1960) Layer II is at best problematic.

Excavation Unit A

The floor of Component II is situated on the surface of a banded, yellow silt and grey clay matrix of varved appearance. The floor is overlain by medium to fine brown sand. The floor dips slightly to the southwest. In Unit A, there is little dark staining of the floor and no suggestion of disturbance.

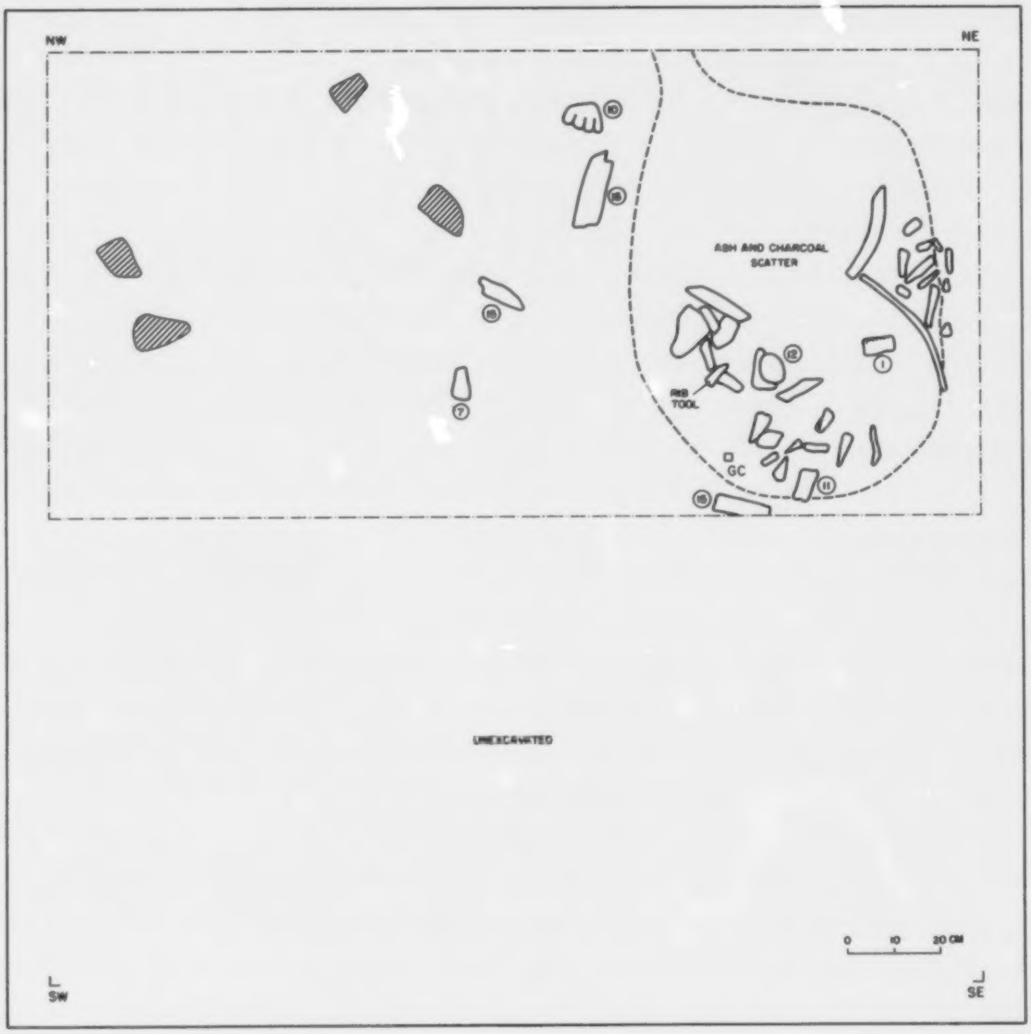
A small hearth was intercepted by the excavation unit and partly exposed along the south wall. It is about 16 cm wide and protrudes into the unit floor a maximum of 10 cm. The hearth base is about 2 cm below the unit floor, but the clay and silt bands dip around the hearth suggesting a natural declivity was used. The hearth should be described as an unprepared surface hearth. It is ash filled and has stained the lower stratum black to about 4 or 5 cm below.

Dating

Insufficient charcoal was available from this unit for radiocarbon dating. No diagnostic artifacts were recovered.

Artifacts

No artifacts were recovered. One piece of fire-broken rock was noted near the middle of the unit.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ASH AND CHARCOAL
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TOOL
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Figure 12. Floor plan, Unit B - Component I.

Faunal Remains

Only eight bone fragments were recovered (Appendix II). Two were identified as bison, one is a third phalanx, and the other is a rib shaft fragment. One of the unidentifiable fragments was calcined, although it was not directly associated with the hearth.

Interpretation

Obviously, Component II as exposed in excavation unit A is minimal. One might imagine a few people sitting around a small hearth roasting meat for a meal; however, there is little one can say with certainty about the Component II occupation.

Excavation Unit B

The floor of Component II is situated on the surface of a silt and clay stratum. Unlike Unit A, there is more dark staining of this surface. This is probably the result of cultural activity. Charcoal was scattered over the surface, although no feature-like concentration was noted. The floor dips about 8 cm towards the northeast. It is capped by silts and appears to be undisturbed.

Dating

A combined radiocarbon sample was secured from dispersed charcoal on the floor. The sample weighed over 100 g before cleaning from a matrix containing silt with some sand, clay and rootlets. Sample size was reduced to 10.04 g after cleaning. The date secured was 615 ± 120 years B.P. (S-2039) or approximately A.D. 1335. As noted earlier, Forbis (1960:159) estimated Layer I to date to A.D. 1400-1500. The date from Component II suggests that Layer I may date very slightly earlier than estimated. No diagnostic artifacts were recovered.

Artifacts

Only eight artifacts were recovered from Component II in Unit B (Appendix I). All were found in the screen. A marginally retouched, black chert flake fragment, a small, obsidian thinning flake and six pieces of shatter constitute the assemblage. The latter includes Swan River chert (2), petrified wood (2), obsidian (1) and Montana Chert (1).

Except for one of the petrified wood items, which was about 3.5 cm long, all are about 1 cm in maximum length. Four small fragments of fire-broken rock were noted on the unit floor.

Faunal Remains

Of 117 bone fragments recovered from Component II in Unit B, 75 were identified as bison and one as canis (Appendix II). Rib fragments are frequent, while bison femur fragments may suggest marrow extraction.

Interpretation

Component II is somewhat better represented in Unit B. The small fragments of chipping debris suggest that only minor (resharpening?) lithic use activities occurred here (Figure 13). The bone, charcoal and FBR probably represent material scattered around the periphery of a meat processing area. From the floor plan, I might guess that a major activity zone occurs to the west of the excavation unit.

Component IIA

Component IIA was encountered about 2.45 m below surface in Unit A and about 2.25 m below surface in Unit B. Variation in the thickness of the underlying sterile sand (Unit A:27) and silt (Unit B:29 & 28) layers accounts for the difference (see Figure 10). This component cannot be correlated with Forbis' (1960) stratigraphic description.

Excavation Unit A

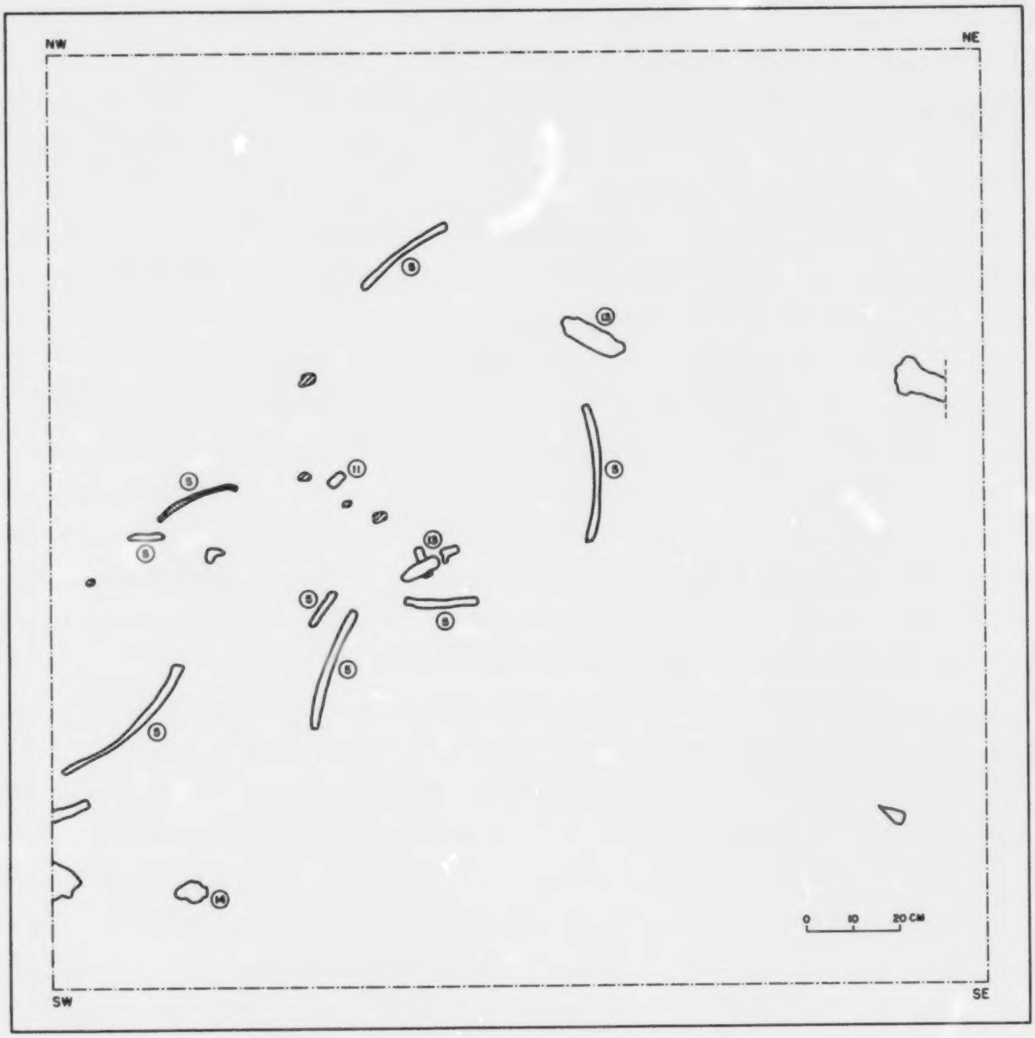
The floor of Component IIA is situated on the surface of a medium to fine brown sand matrix. The floor dips slightly to the southwest. There is little dark staining of the floor. The latter is defined primarily by the change from a sand matrix below to a clayey silt matrix above.

Dating

No radiocarbon dates are available, and no diagnostic artifacts were recovered.

Artifacts

No artifacts were recovered; no fire-broken rock was noted.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0 10 20 CM
SW
SE

Figure 13. Floor plan, Unit B - Component II.

Faunal Remains

A single distal humerus fragment of bison was recovered (Appendix II).

Interpretation

Other than to note that the presence of butchered bone fragment indicates human activity, no interpretation is possible.

Excavation Unit B

The floor of Component IIA is situated on the surface of a silt matrix. The floor is more or less level except for a slightly declivity in the middle of the east wall. The floor is rather darker stained than in Unit A. Silts cap the floor, and there is no evidence of disturbance.

Dating

Neither diagnostic artifacts nor radiocarbon dates were secured.

Artifacts

No artifacts were recovered; no fire-broken rock was noted.

Faunal Remains

Only five bison bone fragments - one maxilla and four ribs - were recovered (Appendix II). Analysis of the maxilla indicates an age of 2.6 years and suggests a fall kill.

Interpretation

No interpretation is possible.

Component IIIA

Component IIIA was encountered about 2.15 m below surface in Unit A and 2.10 m below surface in Unit B. This component cannot be correlated to Forbis' (1960) stratigraphic description.

Excavation Unit A

The floor of Component IIIA rests on a grey silt matrix with some sand inclusions. It is capped by grey silt with red staining. The interface between the layers, that is, the Component IIIA floor, is mottled grey and black. The unit floor dips towards the southwest corner. About halfway along the west wall, the stratum becomes difficult to see, but it may rise into contact with Component III above. This suggests that the components may be inseparable elsewhere in the site. The unit floor is occasionally pierced by rodent burrows which appear to be initiated from the Component III surface; however, this problem is only minor.

Dating

No radiocarbon dates or diagnostic artifacts were secured from this level.

Artifacts

No artifacts were recovered. Two pieces of fire-broken rock are present in the profile, and another was noted on the floor.

Faunal Remains

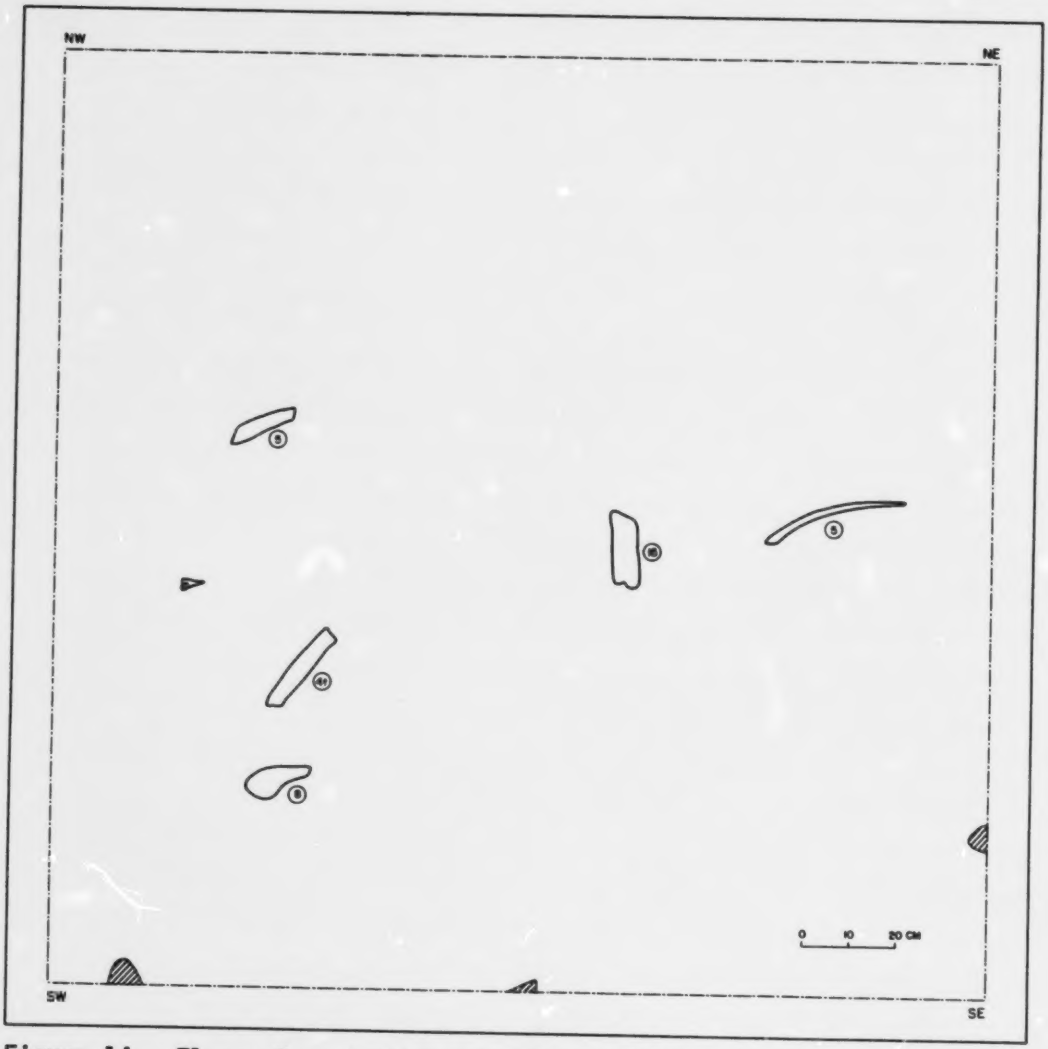
Only 10 bones were recovered; six were identified as bison (Appendix II). These include a thoracic spine, three ribs, proximal ulna and a tibia shaft fragment.

Interpretation

The unit floor appears to have intersected a simple refuse scatter area (Figure 14).

Excavation Unit B

The floor of Component IIIA rests on a silt matrix. There is some dark staining of the floor, possibly the result of increased organics or incipient soil formation. The cultural material protrudes into and is capped by a silt layer. The floor is relatively level. Two areas of disturbance are present. A sand-filled rodent burrow is present in the capping silts along the south wall and intersects the floor there. It is only about 10 cm wide and is confined to the south edge of the unit. A pit feature initiated from Component III pierces the Component IIIA floor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41
0 10 20 CM
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Figure 14. Floor plan, Unit A - Component IIIA.

along the west wall of the excavation unit. The cultural material from this feature is described in the Component III discussion.

Dating

No radiocarbon dates or diagnostic artifacts were secured from this level.

Artifacts

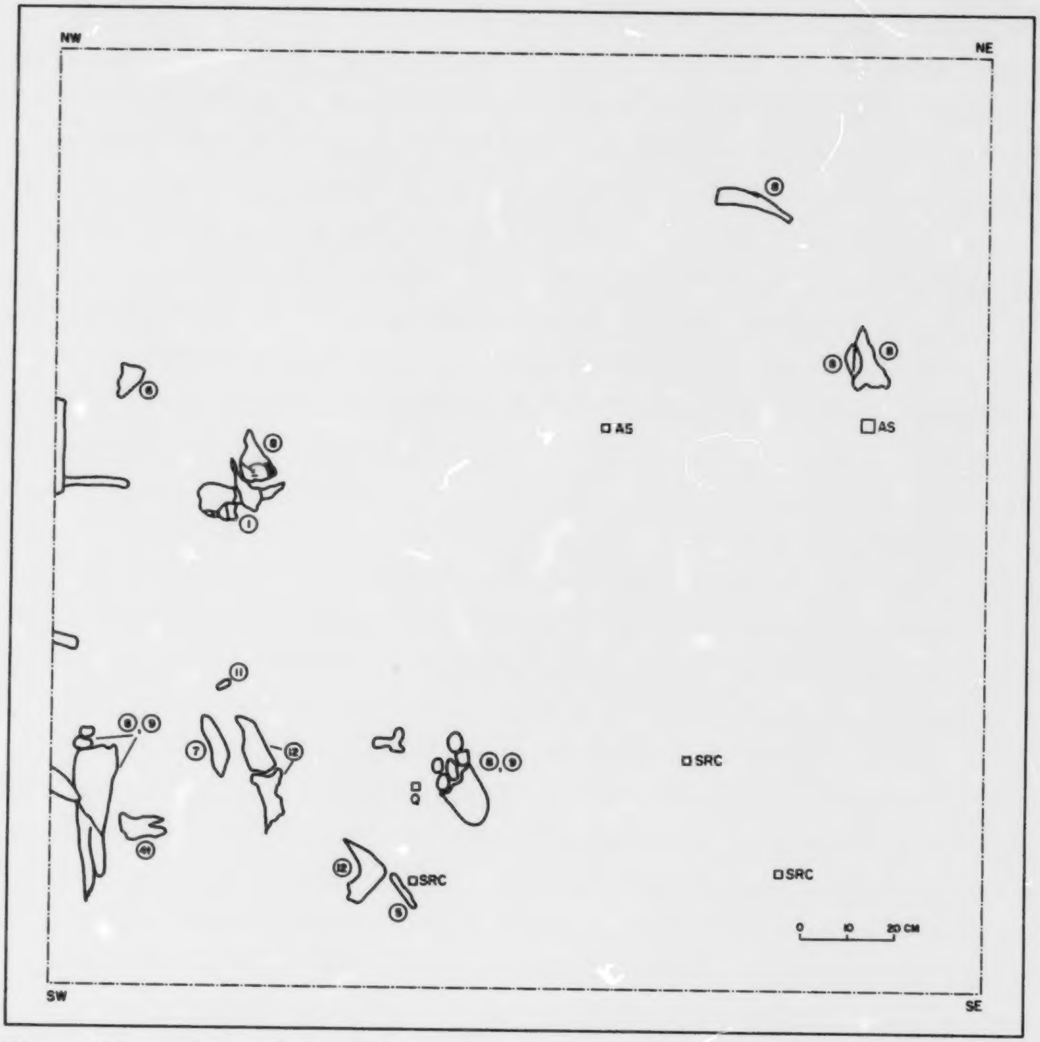
Six lithic artifacts were recovered from this component (Appendix I), including an argilliceous sandstone cobble split transversely by the bipolar technique. It is about 8.5 cm long by 3.0 cm thick at the fractured face. A small (about 3.5 cm maximum length) secondary decortication flake of the same material is present. An 8 cm long secondary decortication flake of red quartzite is also present. A secondary flake, a flake fragment and a piece of shatter of Swan River Chert complete the meagre lithic assemblage. None of these exceeds 2 cm in size.

Faunal Remains

A total of 60 bones was recovered; 29 were identifiable as bison (Appendix II). These include skull, maxilla, vertebra, scapula, humerus, radius, ulna, carpals, phalange, pelvic and rib fragments. Best represented are the forelimbs which have been butchered for marrow extraction. At least two animals are present. Analysis of the maxilla suggests a late summer to early fall kill.

Interpretation

Unit B appears to have intercepted a butchering and marrow extraction area of Component IIIA. An argilliceous sandstone cobble was split and discarded along with a decortication flake on the east-central part of the unit floor (Figure 15). The rest of this material presumably was used or discarded elsewhere, probably east of the unit. Three debitage fragments of Swan River chert may suggest some minimal tool production in the southwest part of the unit. Much of the bone scattered across the unit, especially in the southwest portion, seems to indicate marrow extraction activity. Likely this occurred during the butchering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7
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12
8, 9
8, 9
0
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20 CM

Figure 15. Floor plan, Unit B - Component IIIA.

process with the appropriate elements being broken for marrow removal. Either immediate consumption or retention for later use could have occurred. The broken forelimbs, along with associated carpals, were simply discarded. Neither further processing for bone grease nor cooking activities are indicated here.

Component III

Component III was encountered at about 1.80-1.97 m below surface in Unit A and 1.55-1.75 m below surface in Unit B. This component undoubtedly is the same one identified by Forbis (1960) as Layer III.

Excavation Unit A

The floor of Component III rests on a grey silt exhibiting red stains, probably from decayed rootlets. A sand lens on the east wall profile is discontinuously present on the north and west walls but forms a more or less continuous layer along the south unit wall. This layer thus forms part of the cultural floor. The floor is capped by about 20 cm of grey silt with clay and sand inclusions. Charcoal flecks occur within this matrix. In general, the cultural material was recovered from an 8-10 cm vertical range within the layer. The illustrated floor thus probably represents a palimpsest rather than a simple, "single event" material culture distribution. While there were suggestions of two or three closely spaced occupation floors in several of the riverbank profile cuts, no segregation of such floors could be discerned in Excavation Unit A. This, and moderate rodent disturbance initiated from the floor level and from a surface about 20 cm above the capping silts, suggest that caution should be taken in interpreting associations discussed below.

Dating

No radiocarbon dates or diagnostic artifacts were recovered from Component III in Unit A.

Artifacts

Only 26 lithic artifacts and 12 potsherds were recovered from this component (Appendix I). The pottery includes two rimsherds which appear to represent two vessels. One rimsherd exhibits a truncated fabric impressed surface finish and could be classed as Dr(x) in Byrne's (1973:58) classification. None of the Class D profiles illustrated by Byrne are identical, however; the closest match is with his profile 1 (Byrne 1973:677 Figure 14:1). In my system, the sherd would be described as exhibiting a flat lip with exterior folded rim (Vickers 1973:78).

The second rimsherd appears to have a smoothed, cord-marked surface finish. Indeed, the short segment of rim has been so smoothed that I am uncertain of this classification. The sherd cannot be classified in Byrne's (1973) system. The rim exhibits an out-sloping lip. The rim form varies from exterior folded to parallel folded in my classification (Vickers 1973:78). It is decorated with at least two rows of a possible dentate stamp about 15 mm below the lip. The impressions are shallow and triangular in shape and only c. 2 mm in size. The spacing is uneven with impressions being from 3 to 5 mm apart, suggesting that a coarsely toothed object was impressed into the clay.

The 10 body sherds include three classed as Thick Smooth, one classed as smoothed cord-marked and six that are exfoliated and unclassifiable (Table 8).

Lithic artifacts are described in Appendix I and summarized in Table 9. The small assemblage consists of 26 specimens. The only tool is a marginally retouched flake of chalcedony. This, a secondary decortication flake of silicified siltstone, a secondary flake of quartzite and a specimen of petrified wood shatter are relatively large (4-7 cm maximum length), while the rest of the lithic artifacts are under 2.5 cm in maximum length. One specimen of core shatter of Swan River chert shows the bipolar technique.

Most of the specimens are of local lithic types. Swan River chert, quartzite and petrified wood are common. Exotics comprise three specimens of Montana chert and one of chalcedony. The latter is of an unknown source.

Faunal Remains

A total of 495 bone fragments was recovered from Component III in Unit A (Appendix I). Of these, 63 were identified as bison, 16 as canis and 109 as large mammal. The remainder were unidentifiable. Most of the

Table 8. List of ceramics, Unit A - Component III.

Vessel Portion	Surface Finish	Total
Rim	Truncated Fabric/Net Impressed	1
Body	Thick Smooth	3
Rim	Smoothed Cord-marked	1
Body	Smoothed Cord-marked	1
Body	Indeterminate	6
Total		12

Table 9. Lithic artifacts, Unit A - Component III.

	Swan River Chert	Petrified Wood	Chalcedony	Montana Chert	Silicified Sandstone	Argilliceous Sandstone	Quartzite	Total
Core Shatter	1							1
Shatter	6	3		1		1	1	12
Flake Fragment				1			2	3
Primary Decortication Flake							1	1
Secondary Decortication Flake					1			1
Secondary Flake	1	1					1	3
Thinning Flake	3							3
Retouch Flake				1				1
Marginally Retouched Flake			1					1
Total	11	4	1	3	1	1	5	26

identified bison bones are appendicular elements. Only three vertebral fragments, a skull fragment, a hyoid fragment and seven rib fragments, represent the axial skeleton. The shattered long bones suggest that marrow extraction occurred. The canid remains include a mandible and three loose teeth, a cervical vertebrae, a rib and 11 appendicular elements.

Interpretation

Unit A appears to have intercepted a refuse scatter in the Component III campsite. Charcoal flecks and fire-broken rock suggest a hearth area is nearby (Figure 16); however, the scattered distribution does not suggest any feature in the excavation unit. Similarly, the bone material appears to be randomly distributed, although bone is rare from the east third of the floor. The high proportion of long bone fragments indicates marrow extraction prior to discard here. There is no clear association of the faunal and lithic items; the latter appear to be randomly distributed in the unit. While the potsherds are concentrated in the central portion of the unit floor and northwards to the unit wall, the typological variety again suggests refuse disposal.

Excavation Unit B

The floor of Component III rests on a sand layer. The cultural material is within a banded silt, sand and clay layer above. This layer is up to 15 cm thick, although the two floor plans illustrated are separated only by about 5 cm. While the cultural material distribution likely represents a palimpsest, some discrete clusters of material are recognizable. There is little rodent disturbance of this layer in Unit B.

Two features were encountered in Unit B: a pit and a hearth. The hearth was seen initially as a poorly defined ash and charcoal scatter in the southeast corner of the excavation unit at 164 cm below surface; the pit was not visible at that level. A slight concentration of charcoal in the northeast corner and scattered fire-broken/fire-reddened rock suggested the presence of a hearth outside the unit but close by the northeast corner (Figures 17 and 19). Continued excavation, approximately 2 cm, revealed that the northeast corner concentration was a thin veneer, while the southeast hearth became well defined (Figures 18 and 20). At

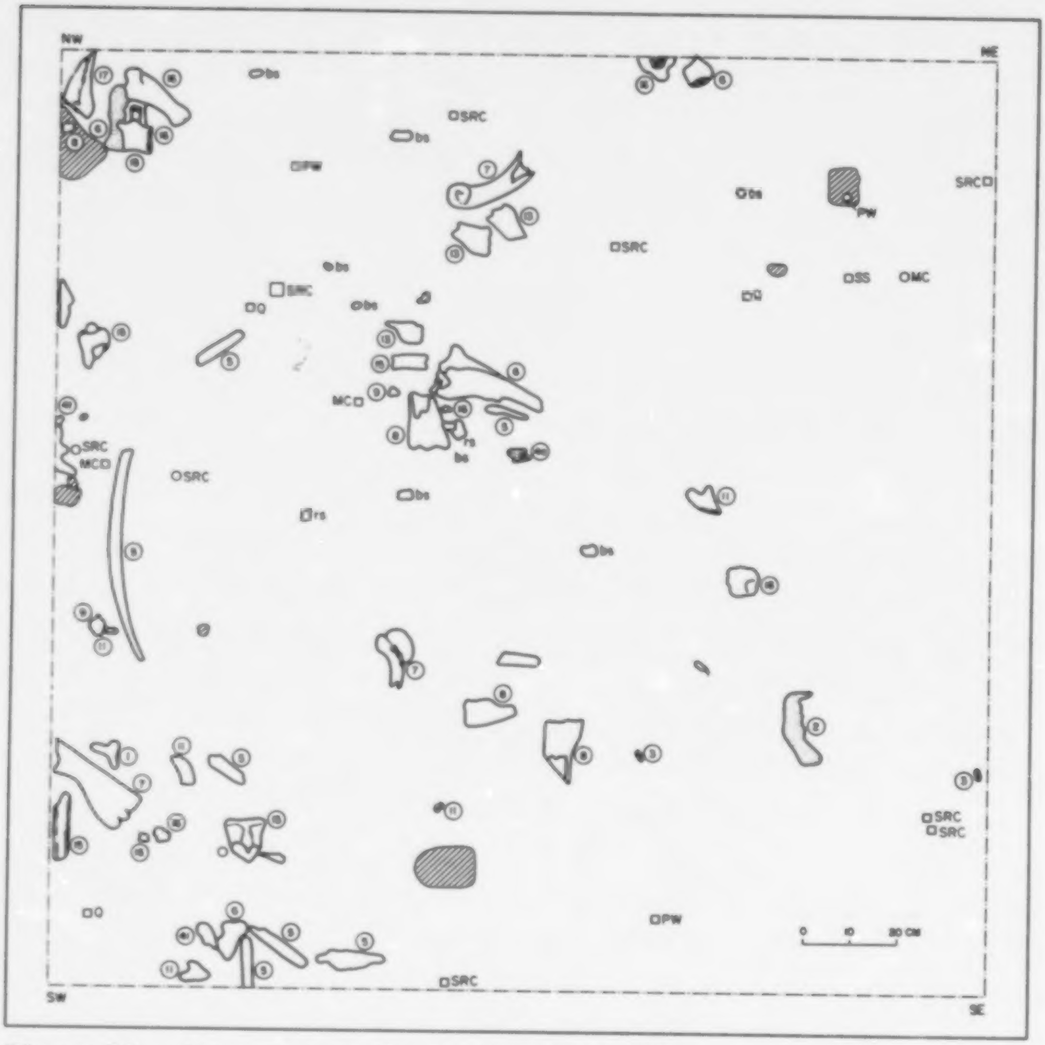
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Figure 16. Floor plan, Unit A - Component III.

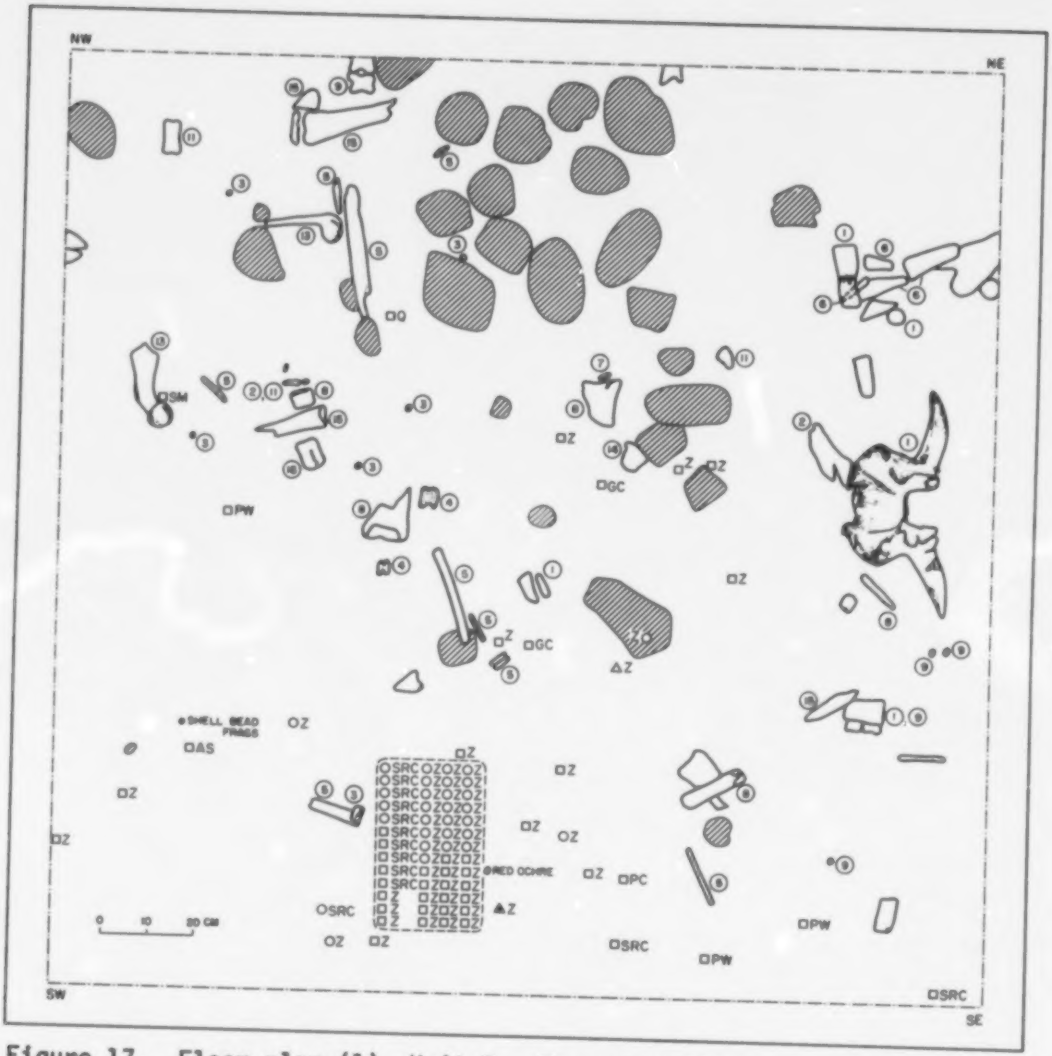
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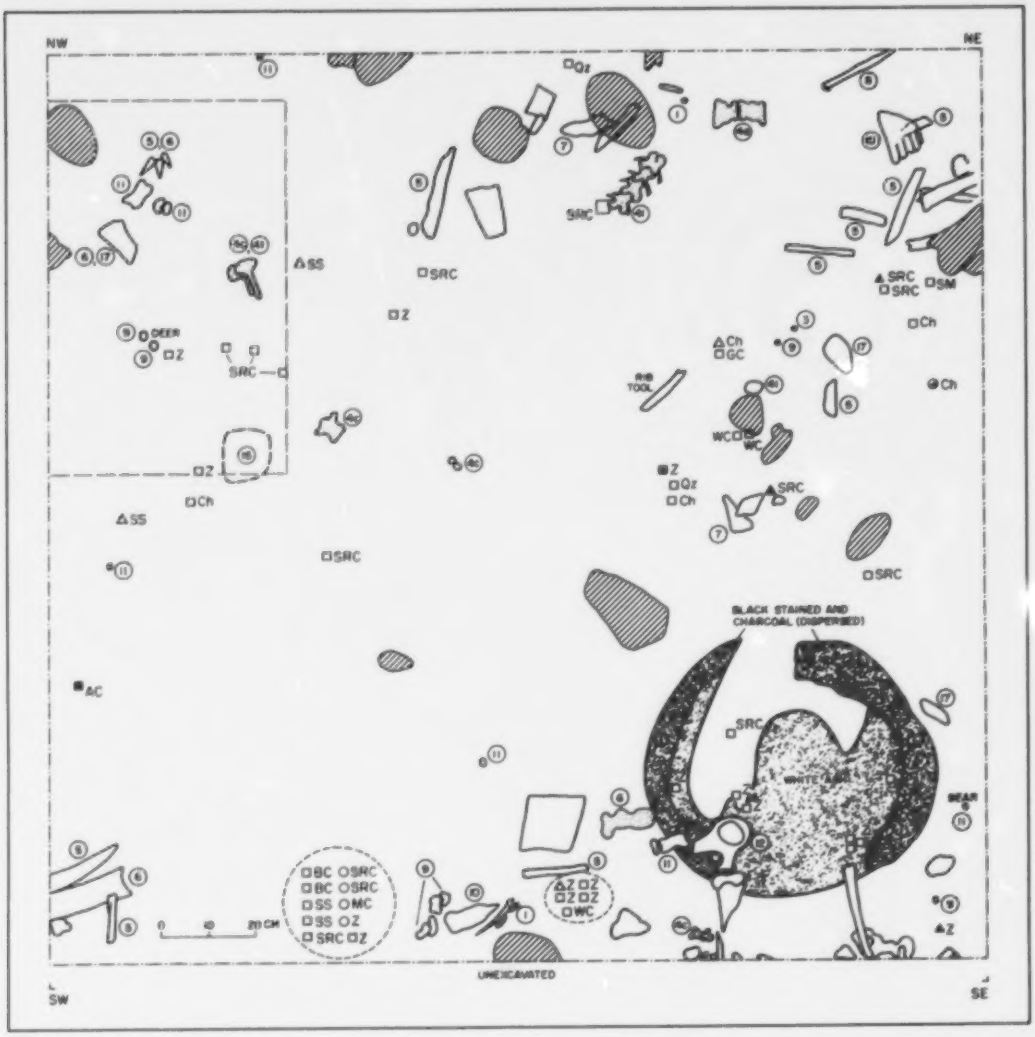
Figure 17. Floor plan (1), Unit B - Component III.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□GC
RIB TOOL
●Ch
WC
WC
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BLACK STAINED AND CHARCOAL (DISPERSED)
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WHITE ASH
BEAR
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□WC
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Figure 18. Floor plan (2), Unit B - Component III.

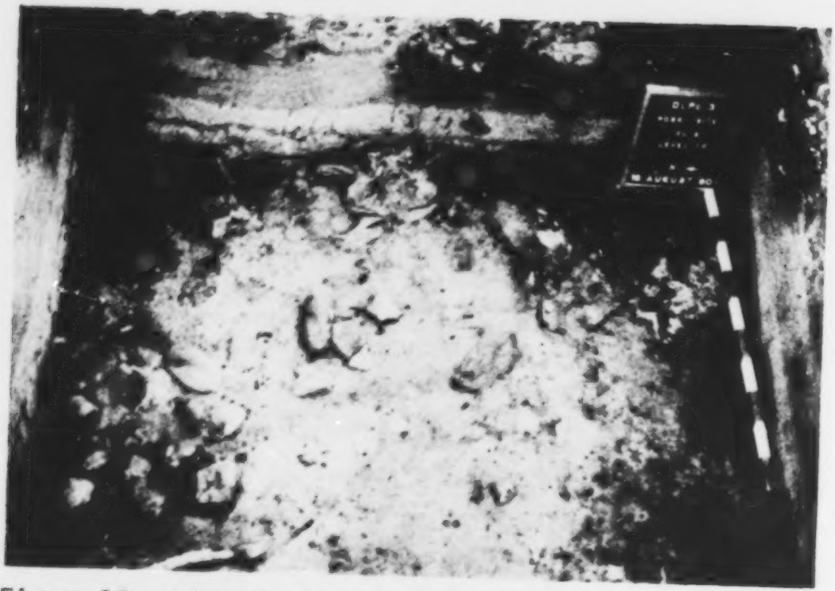


Figure 19. View of east of floor (1), Unit B - Component III.

Figure 20. View east of floor (2), Unit B - Component III.

this point, a pit feature became visible in the northwest corner of the unit.

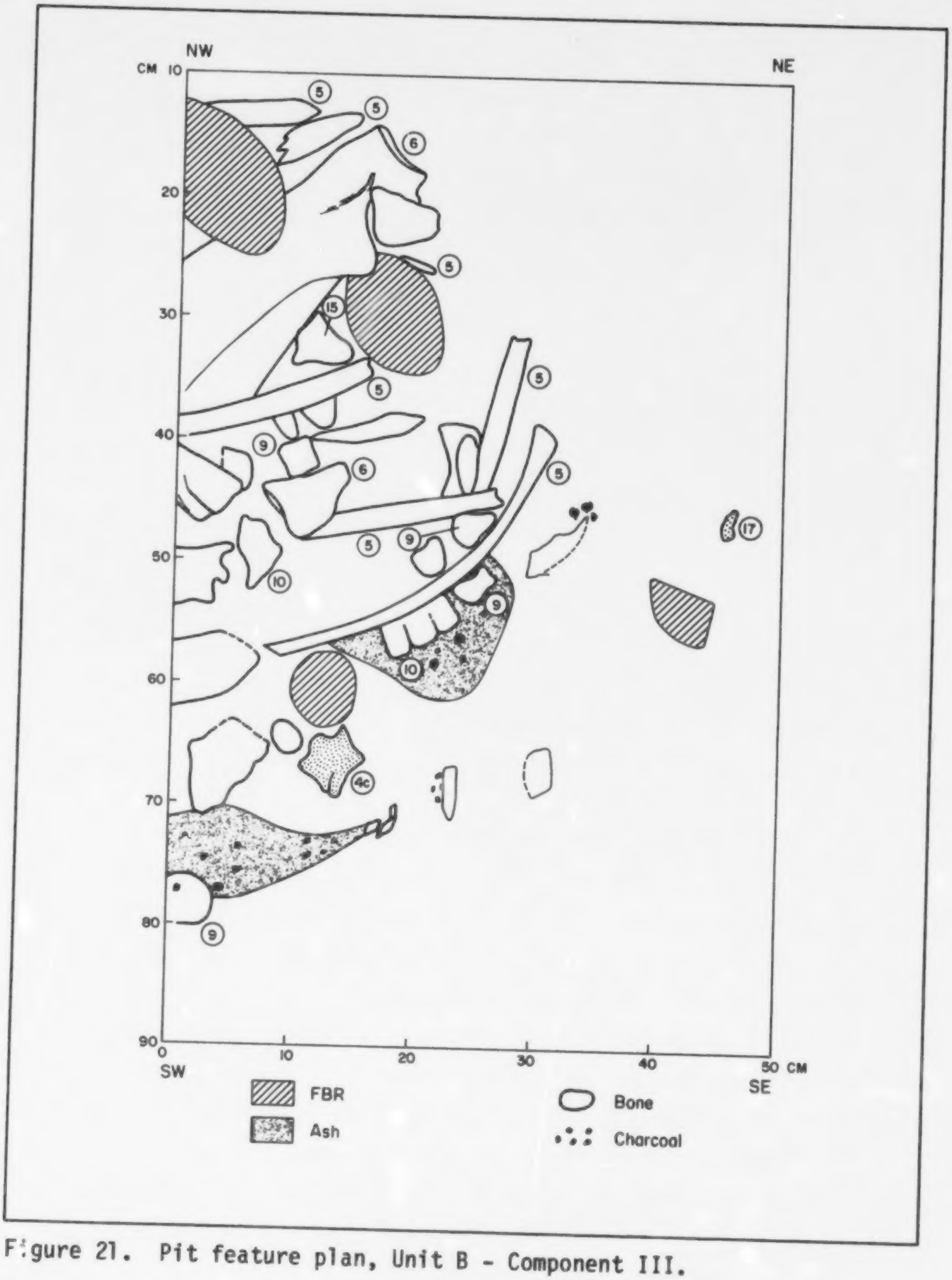
Pit Feature

The feature was recognized in the unit floor at about 166 cm below surface. It appears to have been initiated from the base of the Component III floor. As initially exposed, the feature was defined primarily by tightly packed bone and fire-broken rock; ash and charcoal flecks were concentrated only in the southern edge of the feature (Figures 21 and 22). At this level, the pit is 70 cm long (north-south) and protrudes into the unit floor a maximum of about 30 cm. Thus, the unit roughly bisected the feature along its north-south axis.

In section, the feature is rather complex (Figures 23 and 24). It appears that a rather deep pit (about 48 cm deep) with vertical sides was excavated first. This pit pierced the upper edge of the Component IIIA deposit. The pit was then partly filled, perhaps by slumping of the north edge, so that the basal c. 15 cm is now poorly defined. While its southern edge can be traced primarily by charcoal flecks in the matrix, part of the north edge could not be defined. The lower pit fill contained only fire-broken rock and charcoal flecks.

A second use episode then occurred. I assume that the pit was not refilled, and this use of the upper portion occurred without any re-excavation. Given the "stacked" nature of the feature, this would seem to be the most reasonable interpretation. The upper portion of the pit, about 18 cm deep, is filled primarily with bone and some fire-broken rock. A lens of white ash and charcoal is present; it is thickest on the upper south side of the pit and tapers off and disappears about midway along the profile. To the south, the white ash extends as a thick layer over the pit edge and south along the occupation floor for about 20-30 cm.

The upper pit fill contains three artifacts: Swan River chert core shatter and shatter and a thinning flake of light brown chert. A distal humerus of canis is present; however, most of the bone is bison, including skull fragments, cervical and thoracic vertebrae, ribs, scapula, humerus, femur, tibia, ulna, carpal, metacarpal, phalange and patella fragments. Although some fire-broken rock spalls occur, most of the cobbles are merely reddened, not cracked.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9
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17
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9
FBR
Ash
Bone
Charcoal

Figure 21. Pit feature plan, Unit B - Component III.

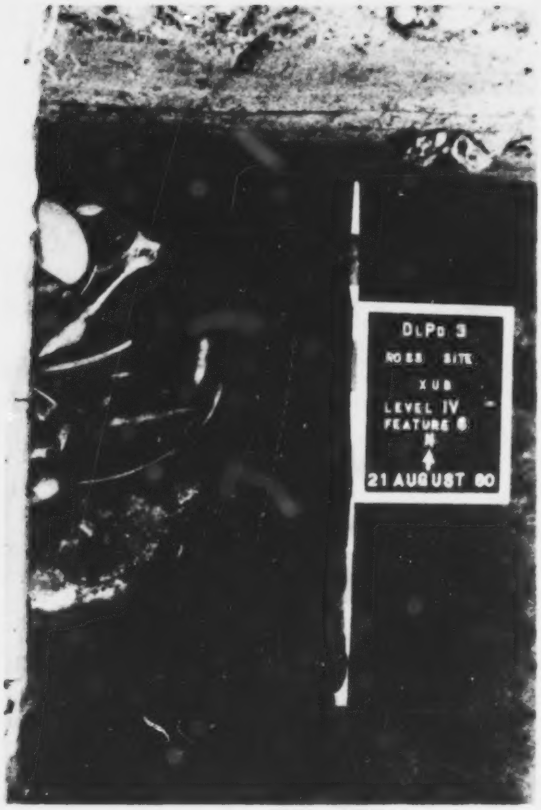
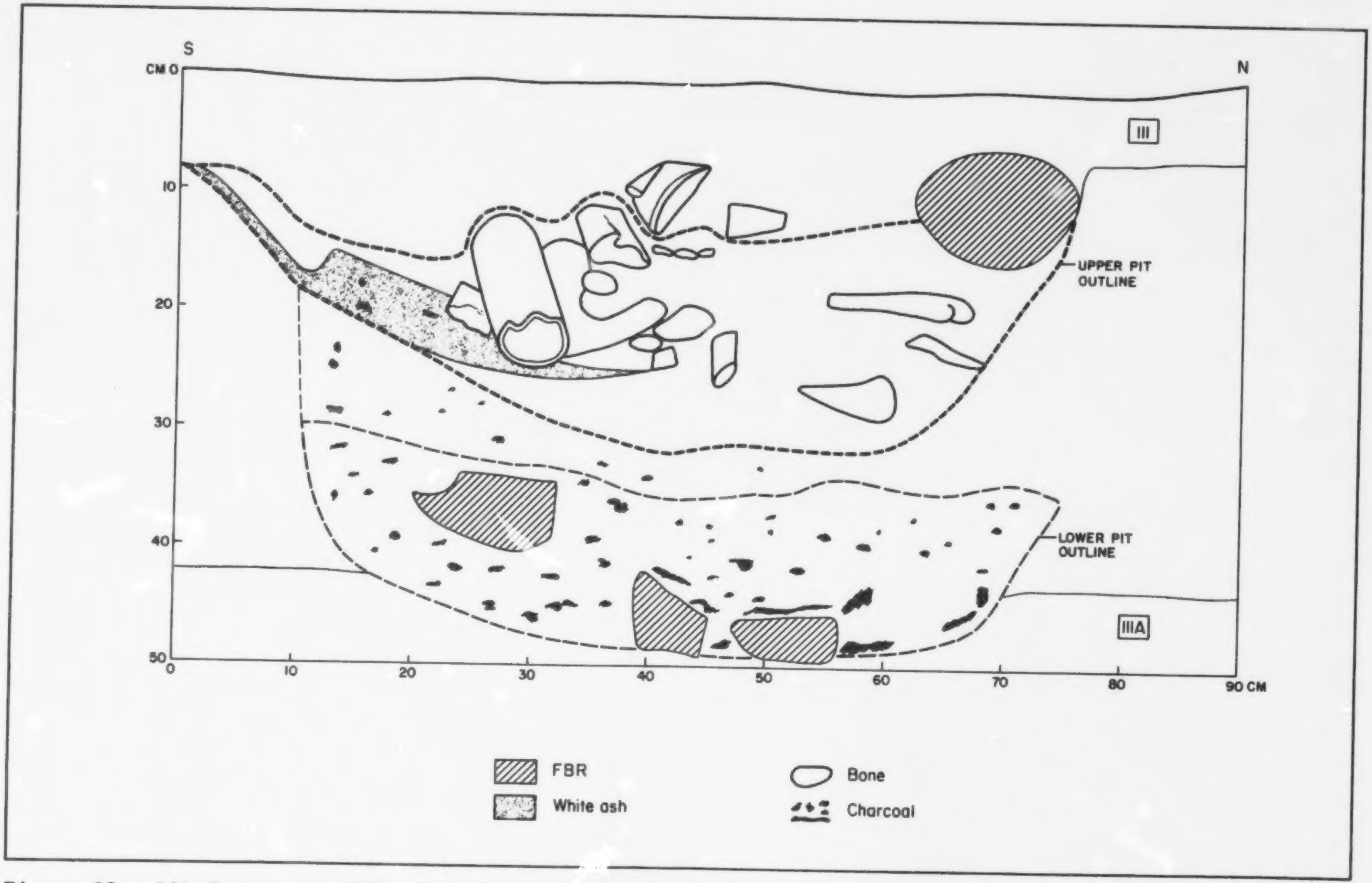


Figure 22. Vertical view of pit, Unit B - Component III.

Hearth

A hearth was encountered in the southeast corner of the Component III floor (Figures 18 and 20). The hearth appeared as a circular concentration of very white ash surrounded by a ring of black-stained soil; the latter resulted from very fine charcoal particles within the soil matrix. From the north edge of the feature, the floor matrix intrudes into the feature; that is, it appears that part of the ash and charcoal has been removed. The hearth is roughly circular and measures 65 cm (east-west) by 55 cm (north-south). It was sectioned (east-west) and appears to be a shallow (about 5 cm maximum depth), flat-bottomed, basin-shaped hearth. No soil reddening was noted (Figure 25).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UPPER PIT OUTLINE
LOWER PIT OUTLINE
FBR
White ash
Bone
Charcoal

Figure 23. Pit feature profile, Unit B - Component III.

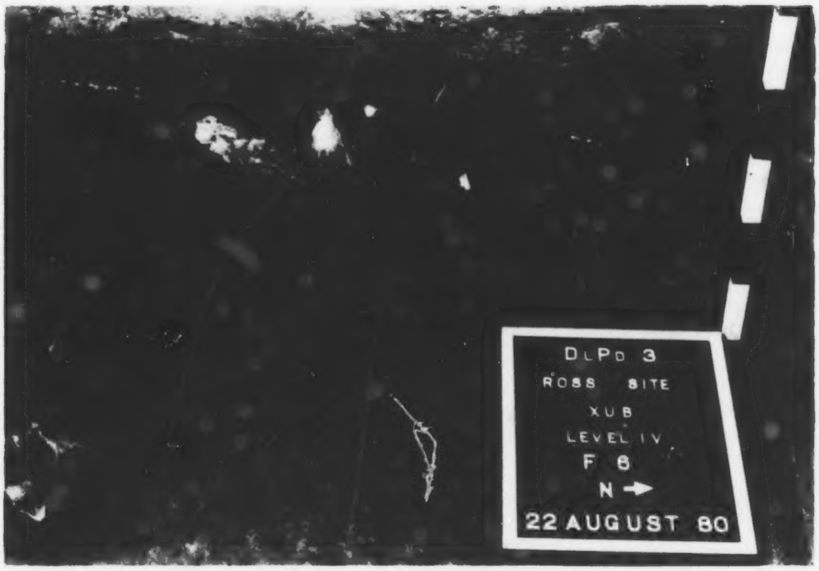

Figure 24. View west of pit, Unit B - Component III.

Dating

A radiocarbon sample was collected from concentrated charcoal within the lower matrix of the pit feature. As noted previously, that feature pierced the upper portion of the Component IIIA floor. There was relatively little material in that component, however; no hearths or charcoal were noted, and I doubt that there has been any contamination of the sample. In other words, the association of charcoal sample with Component III is considered correct. The sample weighed over 100 g before cleaning from the sandy matrix; the submitted sample weighed 35 g. The sample dated to 540 ± 134 years B.P. (S-2038) or approximately A.D. 1410. Although this is rather earlier that Forbis' estimate of A.D. 1700 (1960:121), sample date S-2038 has a rather large standard deviation, and Forbis' estimate is approached at two standard deviations. I would suggest, however, that both Components II and III may date about 100 years earlier than previously estimated.

Of the four classifiable projectile points from this component, two are Pekisko and two are Paskapoo. These types are expected to be rather frequent in post A.D. 1300 deposits, based on the Old Women's Buffalo Jump typology (Forbis 1962; see also Vickers 1986a:99). While this is in agreement with the radiocarbon date, no finer chronological interval can be specified.

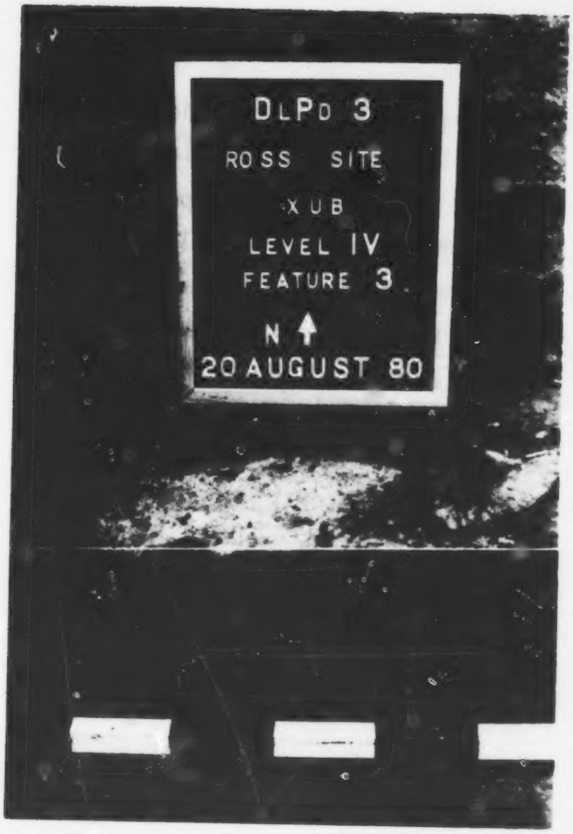

Figure 25. View south of hearth, Unit B - Component III.

Artifacts

Component III in Unit B yielded the largest assemblage of lithic artifacts recovered during the 1980 project (Table 10). In addition to the 621 lithic specimens, a single potsherd was recovered. The latter is an exfoliated body sherd and cannot be classified.

Lithic artifacts are described in Appendix I and summarized in Table 10. As might be expected, the assemblage contains the greatest number of formed tools recovered: seven projectile points, two biface fragments, a uniface fragment, an endscraper and a fragment of an unidentifiable tool. Of the seven points, two consist of tip/blade fragments, and one is a base. Three points are obsidian, and one is Montana chert; these lithic materials are of obvious exotic origin. Two points of Swan River chert, and perhaps one of brown chert, are of local origin. The single endscraper is fashioned from Avon chert, and one biface fragment is made of Montana chert. The other tools may represent local lithic source materials.

Debitage dominates the assemblage, and more categories occur as would be expected given the sample size. Interestingly, obsidian is the most frequently occurring lithic material, forming about 42 percent of the assemblage. While much of this is composed of tiny (c. 1 cm maximum dimension) edge retouching flakes, a fragment of core shatter, and a platform preparation flake indicate some reduction of the raw material; pieces up to about 4 cm long occur. Other exotic materials include Avon chert (n=2), Montana chert (n=21) and at least some of the chalcedony (n=31). Much of the assemblage (about 23%) is composed of Swan River chert of presumed local origin. Petrified wood (n=17) occurs in small quantities, and quartzite is singularly low (n=8).

Faunal Remains

Of 1,844 bone fragments recovered from Component III in Unit B, 279 were bison, 177 were canis, and three were odocoileus. One each of ursus, vulpes and lagomorph were identified as well (Appendix II). Of the 1,382 remaining fragments, 839 are from large mammals, eight are from medium-sized mammals, and six are from small mammals. Three bird bones were also identified. About two-thirds of the bison bone is from the axial skeleton, although the remaining appendicular portion includes examples of most elements. The bone is heavily fragmented, suggesting marrow extraction and bone grease preparation. At least two foetal animals are present.

Canid remains are common in Component III of Unit B, and at least three individuals are present. These, as well as the bones of (kit?) fox and hare, appear to have been selected as raw material for bone bead production. The metapodials were grooved, probably with a sharp flake as remaining groove widths are just under 1 mm in width. The bones were not cut through, rather a rim about 1 mm wide was left in the middle, and the bone was subsequently snapped. This was not always successful; the fox metapodial split along the longitudinal axis of the bead. Cut marks on the canid bones (n=2) indicate that the resulting bead blank was 5 mm long. On the hare bone, a 10 mm blank is indicated. In addition, the

Table 10. Lithic artifacts, Unit B - Component III.

	Pebble Chert	Swan River Chert	Petrified Wood	Silicified Mudstone	Silicified Siltstone	Quartz	Limestone	Chalcedony	Montana Chert	Red-Brown Chert	Milky White Chert	Milky White Dendritic Chert	Brown Chert	Avon Chert	Grey Chert	Black Chert	Light Brown Chert	Obsidian	Argillite	Porcellanite	Quartzite	Argillaceous Sandstone	Total
Projectile Points		2							1				1					3					7
Biface Fragments									1			1											2
Uniface Fragments																		1					1
Unidentified Tool Fragments								1															1
Endscraper														1									1
Marginally Retouched Flakes		1		1				2										2					6
Marginally Retouched Shatter																		1					1
Utilized Flakes					2			1										5					8
Utilized Shatter															2								2
Core Shatter		2																1					3
Platform Preparation Flake																		1					1
2ry Decortication Flakes	1			1				1		1											1		5
Bipolar Split Pebble					1																		1
2ry Flakes		2		4				1							1	3		5				3	19
Thinning Flakes		26		2				5	8	2		3		1	9	6	3	40		1			106
Retouch Flakes		22						10	8		9				6	1		48		2			106
Flake Fragments		31		3	2	1			3		4	2			9	4	1	59		1			120
Shatter		57	17		4	2	1	10		7	1				17		3	97	2	1	7	5	231
Total	1	143	17	11	9	3	1	31	21	10	14	6	1	2	44	14	7	263	2	5	8	8	621

pierced bear claw evinces considerable industry devoted to ornament production, as do five shell bead fragments.

Interpretation

Although stratum Unit B:24, which contains Component III, is up to 16 cm thick, most of the cultural material illustrated on the floor plans comes from a vertical range of no more than 5 cm. Precisely what this means in terms of length of occupation (or reoccupation?) of the unit level is unclear. I shall treat this as a single season of cultural deposition in excavation Unit B, a treatment which I think intuitively to be correct. Other than to note that there is no obvious stratigraphic break, I am at a loss as to how to demonstrate that proposition.

The pit feature might have been a cache or a boiling pit or roasting pit. Nicholson (1985) describes a shallow, rock-covered cache pit from Manitoba. While shaped differently from the Component III pit, the need for a secure cache of frozen meat products is well argued, and a similar function is possible. However, neither the charcoal flecks nor fire-broken rock are consistent with this interpretation.

The feature may be a boiling pit. This possibility is supported to some extent by the nature of the faunal remains. As Driver (Appendix 2) notes, the large quantities of fragmented bone may indicate bone grease preparation. This process involves dropping hot rocks into a skin-lined pit, however, and I would expect that the resulting deposit would include both bone scrap and small fragments of cracked rock. In contrast, the lower pit fill contains a few large fire-broken rocks and quite extensive charcoal; the latter does not seem consistent with the boiling pit hypothesis.

Wissler describes meat roasting in pits:

> . . . a hole might be dug in the ground, many hot stones placed in the bottom and over these a layer of willow branches and grass. Next, a layer or two of foetal and newly born calves over which again were spread branches, grass, and finely earth. . . . A variation of this was similar to the mode of roasting camas. A hole was dug to the depth of four spans of the thumb and fore finger and lined with hot stones and brush as before. Dressed calves were wrapped in fresh hides, two hides spread over the brush, water poured in, the calves quickly placed and the hole covered with two more fresh hides. The upper hide was stretched and staked. The earth was heaped

> over all and a fire kindled on top (Wissler 1910:24-25, cited in Verbicky-Todd 1984:177).

Pokotylo and Froese (1983:129-131) cite generally similar root-roasting pit descriptions.

Such a function could account for the presence of charcoal and the lack of bone and small fire-cracked rock in the lower pit fill. The cobbles on the unit floor are fire reddened and little broken; this would seem to be more consistent with a roasting rather than immersion use. Certainly, the extensive fire-broken rock deposit that one would anticipate from extensive bone-boiling or grease preparation activity is not present. I shall therefore interpret the use of the pit feature as that of roasting, either of meat or roots, and reject the bone grease preparation process on the basis of insufficient fire-broken rock.

If the rock on the unit floor represents hot stones removed from the roasting pit, it is not clear where they were heated. The hearth in the southeast corner of the unit is nearby and might be a reasonable candidate, but the thin ash/charcoal veneer encountered in the northeast corner may indicate the presence of a hearth close by but outside the unit.

The upper fill of the pit feature consists of a jumble of bone and a white ash lens on the southern edge of the feature. As noted earlier, there appears to be a random selection of bone elements in the upper pit fill, everything from skull fragments to toes. The ash layer is also interesting in that it appears to have been deposited from the south side of the pit. The hearth in the southeast corner of the unit has had a portion of white ash removed from its northern edge. These observations lead me to believe that the material constituting the upper pit fill is refuse removed from the southeastern hearth. A bison scapula may have been used for this purpose. Presumably, the pit remnant, subsequent to the roasting episode, formed a handy trash pit. Its use may have resulted from the desire to clean a specific feature - the hearth - since the extensive bone litter on the unit floor suggests no general concern with tidiness.

The hearth also is of some interest. It is filled with very white ash and surrounded by a ring of dispersed charcoal particles. Whatever was burned, combusted rather completely - there are no charcoal chunks present. However, the fire does not seem to have been hot enough to cause red staining of the adjacent soil. I would suggest, therefore, that dung was burned in the hearth. This is consistent with observations of experiments conducted at Head-Smashed-In by Milt Wright (personal communication 1986).

Very little bone is present in the southwest quarter of the unit floor, but this area did yield abundant chipping debris. For example, about 70 percent of the piece-plotted obsidian specimens occur in this quadrant. These include shatter, flake fragments and retouch flakes. The finished tools of this material are elsewhere: a projectile point is southeast of the hearth, while a uniface is north of that feature. Also in the southwest quadrant is an Avon chert endscraper and chipping debris from a variety of materials - black chert, Montana chert, Milky white chert, Swan River chert and silicified siltstone. Most of these represent high value lithic materials, that is, lithic types commonly used in the production of fine tools. Obviously, the flint knapper had access to a wide variety of lithic materials from far-flung quarry sources and had curated these for later tool production. Secondly, the artisan customarily sat and knapped near the hearth, assuming the lithic varieties indicate more than one knapping event. Lastly, the flint knapper was probably male since at least some of the production was directed towards projectile point manufacture.

A second production activity that occurred within the Component III campsite area intersected by Unit B is ornament production. Fragments of a shell bead are present in the southwest quadrant, while a pierced black bear claw was recovered immediately east of the hearth. Fifteen canid metapodial epiphyses, and one each of fox and hare, also attest to ornament production. Unfortunately, point provenience was not taken on the metapodials, but the sequence of field numbers suggests that they were also from the southern part of the unit. Again, I would suggest this was a male production activity, as I believe bear claw pendants were likely male apparel. Possibly some of the sharp obsidian flakes noted in the area were tools for this activity.

Driver (Appendix II) discusses alternative interpretations of the Component III bone data, noting that both cooking and bone grease preparation are indicated. Certainly the floor is littered with bone;

some of this - an immature bison skull, scapulae and long bone portions - is quite large. This material looks like trash; there is no obvious sorting of bone elements on the unit floor. This also is true for the upper pit fill. Interestingly, no stone tools large enough for major butchering were discovered in the unit.

As Driver notes (Appendix II), two foetal skeletons of bison are represented. On this basis, he suggests that a mid-winter kill event is indicated. A winter occupation period would suggest that Unit B intersected a lodge floor in the Component III campsite. This would be supported by the presence of the pit feature, surely difficult to excavate through frozen ground outside a lodge, and by the evidence that a number of fine stone and bone working tasks were undertaken. The latter presumably involved sitting still and working with unprotected hands. There does seem to be an awful lot of large debris, either bone and rock, for the inside of a habitation, however. Even assuming the occupants were not the most fastidious of housekeepers, one imagines they had no desire to trip over a buffalo skull in the middle of the night. Of course, it is possible that both interior and exterior conditions accrued over the course of the season's occupation, so I shall leave this unproductive discussion with no further speculation.

Component IV

Component IV was encountered about 1.25 m below surface in Unit A. In Unit B, bone from within a massive gravel deposit at 0.85-1.20 m below surface is also designated Component IV; however, I am uncertain about this correlation. This is discussed further below. These and subsequent cultural layers are above Forbis' Layer III and were not noted in his study. The minor scattered materials recovered in the 1980 project, and the massive gravel layer reported above Layer III in the earlier work, indicate that they were removed in that part of the site.

Excavation Unit A

Component IV is situated within a clay layer containing sand and silt lenses. Below is an uneven contact with a coarse sand layer while above is a fine silty sand. The unit floor appears to be undisturbed. I should note that the contact between the underlying sand (Unit A:17) and the clay/silt/sand layer (Unit A:16) containing Component IV is poorly defined along the south wall of the unit (see Figure 7).

Dating

No radiocarbon dates were secured, and no diagnostic artifacts were recovered.

Artifacts

No artifacts were recovered.

Faunal Remains

Twenty-two bones were recovered, but only two could be identified (Appendix II): a bison humerus shaft fragment and a rib.

Interpretation

Other than to note that the butchered bison bone indicates human activity, no interpretation is possible.

Excavation Unit B

Component IV is situated within a thick horizon of sand and gravel in Unit B. The lower part of this consists of a sand layer (Unit B:16) which grades to a sand and gravel layer (Unit B:15). In total, these layers are 35-40 cm thick. The cultural material was mixed throughout the deposits (see Figures 8 and 10).

It is unclear if the cultural material in Unit B can be equated to that in Unit A. The cultural material in the latter is located on top of a coarse sand layer (Unit A:17) which may be equivalent to the sand layer in Unit B (Unit B:16). If so, the flooding event which buried the excavation unit A material in clay (Unit A:16) may have scoured and tumbled the material in the excavation Unit B area, leaving it mixed with the gravels (Unit B:15) in that area. In any case, it is obvious that the cultural material in the unit has been disturbed by natural processes.

Dating

No radiocarbon date was secured, and no diagnostic artifacts were recovered.

Artifacts

One Swan River chert core fragment and one quartzite secondary decortication flake constitute the meagre artifact assemblage from this level.

Faunal Remains

A total of 775 bones was recovered; 206 were identified as bison and nine as canid (Appendix II). On the basis of size of an immature specimen, it is thought that a late spring or summer kill is evinced. If the cultural material was disturbed by flooding in the same year it was deposited, the kill would have occurred prior to the early June flood period (see Alberta Environment 1976:Figure 12). Of course, there is no particular reason to believe that these events occurred in the same year.

Interpretation

I believe that little interpretation of the Unit B Component IV material can be undertaken since the material is the result of natural rather than cultural deposition processes.

Component V

Component V was encountered at about 0.73 m below surface in Unit A; it is not present in Unit B.

Excavation Unit A

Component V is situated on top of a compact grey clay layer and is capped by a mixed clay and silt layer mottled with red stains. The latter are probably the result of decayed rootlets.

Hearth Feature

A hearth was encountered on the floor in the south central sector of the unit (Figure 26). It was defined by charcoal flecks and some very small, non-calcined bone fragments. The hearth is circular, about 40 cm

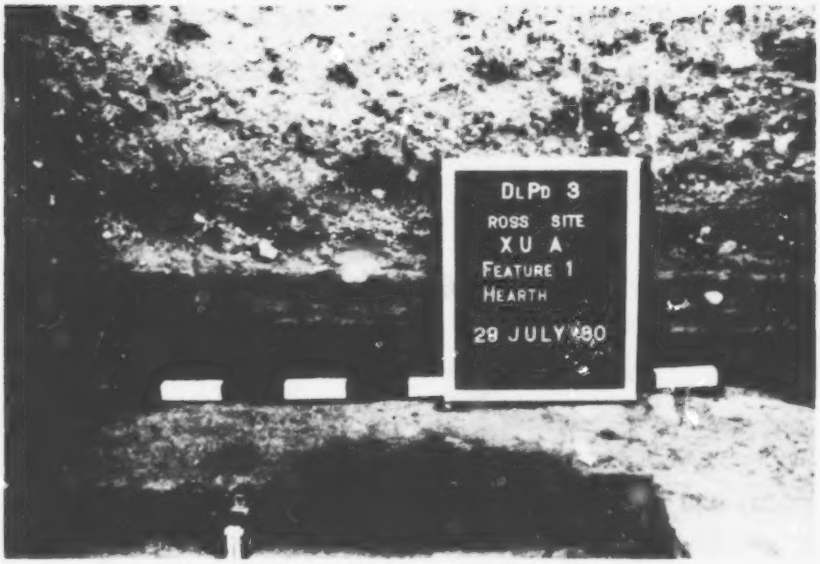
DLPD 3
ROSS SITE
XU A
FEATURE 1
HEARTH
29 JULY 80

Figure 26. View south of surface hearth, Unit A - Component V.

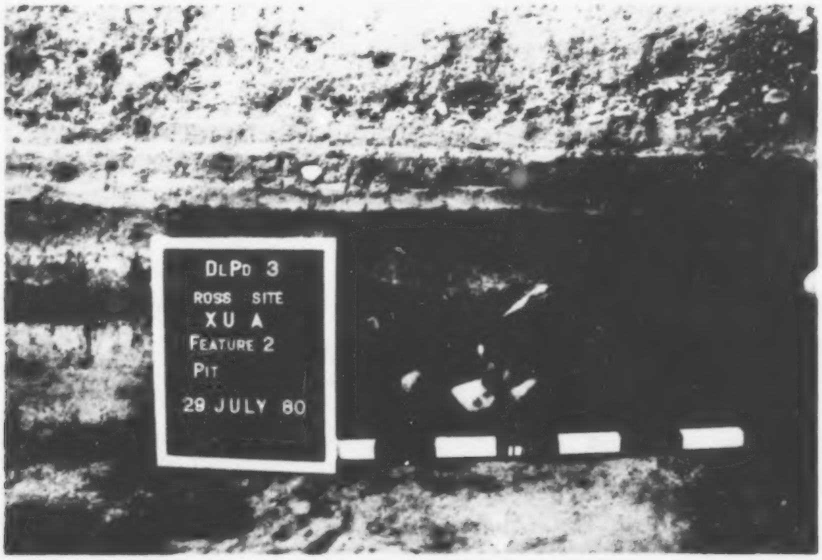
DLPD 3
ROSS SITE
XU A
FEATURE 2
PIT
29 JULY 80

Figure 27. View south of pit, Unit A - Component V.

in diameter. In profile it is 2-3 cm thick. The perimeter shows occasional, slight reddish staining. The hearth appears to be a simple surface hearth.

Pit Feature

A pit is present in the west end of the south wall; it protrudes into the unit floor about 15 cm. As sectioned by the unit, the pit is about 37 cm long (Figure 27). If circular, the feature is cut fairly close to its midpoint. The pit has a maximum depth of 20 cm and is 20 cm wide at the bottom. The west edge is cut vertically, while the east wall slopes more gently. The pit contained a thoracic vertebrae spine and cervical vertebrae fragment identified as bison. As well, two cobbles and two large pebbles were present; these were not noted to be fire-reddened.

Dating

Insufficient charcoal was recovered to secure a radiocarbon date. Diagnostic artifacts were not recovered.

Artifacts

One fragment of ironstone shatter was recovered. This is only about 1 cm long and may be non-artifactual.

Faunal Remains

Only 56 bones were recovered, four of which could be identified as bison (Appendix II).

Interpretation

Component V is minimally represented by faunal material, although two features were present: a small surface hearth and a pit. No particular function can be ascribed to the latter, but meat roasting might be a reasonable guess. Given that no occupation was noted in Excavation Unit B, the Component V remains in Excavation Unit A may indicate a very brief stopping episode.

Component VI

Component VI was recognized in Unit A only. It occurs at 0.62 m below surface.

Excavation Unit A

Component VI is situated in a brown-grey silt layer. It is capped by bedded, coarse sands which are present only in the southeast and northwest corners of the unit. A 50 cm deep layer of sand and gravel caps the floor and the bedded sands. Presumably, most of this occupation was destroyed by the flooding event.

Dating

No radiocarbon date was secured, and no diagnostic artifacts were found.

Artifacts

No artifacts were recovered.

Faunal Remains

A total of 10 bones was recovered; two were identified as bison (Appendix II).

Interpretation

The bone fragments were discovered at the base of the sand and sand and gravel layers and appear to represent a remnant of a cultural layer that escaped flood erosion. The remaining items are too few to permit interpretation.

Component VII

Component VII was noted in Unit B only. It is situated at about 0.30-0.44 m below surface.

Excavation Unit B

The depositional context represents natural rather than cultural processes. The few bones from the component are mixed in a sand and gravel matrix. The stratigraphic position suggests this may be redeposited Component IV material, but this cannot be demonstrated.

Dating

No radiocarbon date was secured, and no diagnostic artifacts were recovered.

Artifacts

No artifacts were recovered.

Faunal Remains

Only 18 bone fragments were recovered; two were identified as bison (Appendix II).

Interpretation

This deposit represents a natural flooding event, although the bone may be redeposited cultural material. No further interpretation is possible.

THE RIVERBANK EXPOSURE

During the profiling of nine sections along the riverbank, cultural material was encountered. When found in situ, the location was flagged and ultimately transferred to a composite profile. Artifact collection was avoided except for those items which were displaced; these are best treated as a surface collection. This material includes three projectile points, three core fragments or core shatter and 30 items of debitage. The material is described in Appendix I and will not be discussed further here.

Three hearths were also examined along the exposure in an attempt to acquire charcoal for dating purposes. These would have had some utility if the excavation unit dating samples had proven inadequate, despite the difficulties in correlating riverbank and excavation unit stratigraphy. Fortunately, the unit samples were sufficient to date Components II and III.

The first hearth was exposed near the bottom of section P13 (Figure 6). This was situated in the second cultural level from the base of the section and could represent Component II, IIA or III. The matrix had a high clay content, and the submitted sample weighed only 7.5 g. The date returned was "younger than 100 years B.P." (S-2043). This date is rejected.

The second sample was taken from a hearth exposed in the cutbank between sections P10 and P11 (Figure 6). Unfortunately, the stratigraphy is very confused in that area, and it appears that the layers rise in the profile from P10 to P11. The sample was extracted from a matrix containing sand, ash, roots and bone fragments. The cleaned sample weighed only 3.6 g and yielded a date of 1535 ± 190 years B.P. (S-2042). I do not know how to interpret this date since it is earlier than the normal range for the Old Women's Phase. It would make better sense as an Avonlea or Besant Phase date. Avonlea Phase material occurs nearby the Ross site at the Upper Kill, DlPd-1 (Forbis 1960:121), but no Avonlea occupation has ever been defined at the Ross site.

The last riverbank hearth sample was located between sections P8 and P9 (Figure 6). Again, slumping along the bank obscures the stratigraphy, but it appears that the hearth was in the second from lowest cultural level when traced to section P9. Presumably, this is equivalent to Component II, IIA or IIIA. The sample was extracted from a matrix containing sand and ash; the submitted sample weighed 7.2 g. The sample yielded a date of 800 ± 135 years B.P. (S-2041). This overlaps with the Component II date from Unit B at one standard deviation and is considered acceptable.

Fine screening of a sediment column extracted from the cutbank adjacent to section P9 has been fully reported elsewhere (Bobrowsky and Ball 1982). Examination of their cumulative data for mesh sizes indicates that bone fragments recovered from the smallest mesh sizes (3.19-1.59 mm and 1.58-0.85 mm) probably represent fragments deposited naturally in the alluvial matrix (Bobrowsky and Ball 1982:105). However, the larger mesh recovery fraction seems to correlate well with the defined cultural components. The lithic recovery also seems to reflect the defined site occupation well. Their plot of lithic recoveries shows a major peak at 1.2 to 1.5 m below surface and corresponds to Component

III (Bobrowsky and Ball 1982:114). There are indications of three cultural levels above, which presumably correspond to Components IV, V and VI. Only three components are indicated below Component III; these probably represent Components IIIA, IIA and II. The column sample probably terminated above Component I. The technique appears to be useful for discovering the presence of cultural layers while causing only minor impact to cultural deposits. Obviously, it is of little utility in defining the nature of such deposits.

SUMMARY

The 1980 investigations at the Ross site revealed nine components in 3 m of alluvial deposits. The lower five components (Components I, II, IIA, IIIA and III) were present in both excavation units and were undisturbed. Above these, high energy events are evinced by gravels and coarse sands, and component preservation was affected by the vagaries of overbank flooding. Components IV, V and VI are relatively undisturbed in Unit A but have been extensively disturbed in Unit B. Indeed, the upper component in the latter unit is a natural flood deposit and cannot be correlated with the Unit A sequence; it has been designated Component VII.

Diagnostic artifacts were recovered from Components I and III only. These are sufficient to allow assignment of all occupations to the Old Women's Phase of the Late Prehistoric Period. Although Forbis (1960:138) recovered a single Avonlea projectile point from Layer III, and I obtained an anomolously early date from a river-cut hearth, the Ross site occupations can be confidently ascribed to the Old Women's Phase. Radiocarbon dates were secured from the excavation units which indicate a date of 615 ± 120 years B.P. (S-2039) for Component II and 540 ± 135 years B.P. (S-2038) for Component III. As well, a small sample from Component I yielded a date "younger than 100 years" (S-2040) which is rejected. Two other dates secured from hearths exposed in the river cutbank yielded dates of 800 ± 135 years B.P. (S-2041) and 1535 ± 190 years B.P. (S-2042). These cannot be confidently related to the cultural stratigraphy defined in the excavation units, however, and the possibility of contamination cannot be excluded. Certainly, the latter date exceeds the usual range for the Old Women's Phase (see Vickers

1983:137). The absence of Cluny Complex pottery (Byrne 1973:652) and Euro-Canadian cultural material indicate that site use had terminated by the Protohistoric Period.

A total of 4,877 items was recovered from the 1980 excavation units. Of this, 84.5 percent was bone, while lithic artifacts formed 15.3 percent of the sample, and ceramics constituted only 0.2 percent (Tables 11 and 12). Fully 94.3 percent of the material was recovered from Components I, III and IV. The cumulative frequency of bone recovery for these three components is 93.1 percent. The cumulative frequency of lithic remains from Components I and III is 97.7 percent, while lithic artifacts are rare in Component IV.

Considering the limited excavation area, features were relatively common. These include a surface hearth and a pit in Component V, a surface hearth and roasting/trash pit in Component III, and a surface hearth in Component II. The features in Components V and II stand in contrast to the relatively low recovery of cultural material from those components.

Seasonality data were obtained for four components. Component IV is interpreted as late spring, Component III is mid-winter, Component IIIA is late summer or early fall, and Component IIA is fall. Of course, these seasonal ascriptions do not exclude the possibility of a longer annual duration at the site.

Activities interpreted from the component data include meat roasting (Component V, III and II), marrow extraction (Components III, IIIA and I), grease preparation (Components III and I), and butchering (all). Tool manufacture and maintenance is indicated for Components III, IIIA, II and I. All these activities would be reasonably expected in a Plains Indian camp. In addition, more specialized activities were noted, including high value tool manufacturing and ornamental goods production in Component III. The latter activity is suggested for Component I also, but since this is based on the absence of limb bones of the butchered canid, the evidence is relatively weak.

In general, the 1980 excavations demonstrated that a wealth of material culture remains of the Old Women's Phase is present in the Ross site. Preservation of organics is excellent, and the quantity of material, about 610 items per square metre, is high. Stratigraphic

Table 11. Frequency of material culture classes by component.

	Lithic Artifacts		Ceramics		Bone		All	
Component	N	%	N	%	N	%	N	%
VII	-	-	-	-	18	0.4	18	0.4
VI	-	-	-	-	10	0.2	10	0.2
V	1	0.1	-	-	56	1.4	57	1.2
IV	2	0.3	-	-	797	19.4	799	16.4
III	647	86.7	13	92.9	2339	56.8	2999	61.5
IIIA	6	0.8	-	-	70	1.7	76	1.6
IIA	-	-	-	-	6	0.2	6	0.1
II	8	1.1	-	-	125	3.0	133	2.7
I	82	11.0	1	7.1	696	16.9	779	16.0
Total	746		14		4117		4877	
% of total	15.3		0.3		84.5			

separation is good, and disturbance is generally minimal. Further discussion of site value follows, while discussion of the prehistoric occupations is offered in the last section.

SITE SIGNIFICANCE

The determination of site significance is a complex and contentious issue in the archaeological literature. Donahue (1982) suggests that, in Alberta, site significance is related to resource management goals of conservation, research and interpretation. In his view, the aim of conservation is to preserve a representative sample of sites, the aim of research is to investigate government-specified research problems, and the aim of interpretation is to explain prehistory to the public. Thus, the value of a site is a function of its redundancy in the sample, its contribution to resolving research problems, and its interpretive attributes.

Unfortunately, there are both practical and philosophical difficulties with Donahue's concept. The determination of representative samples and data redundancy is beyond the practical ability of the discipline, given our current knowledge of the data base. Since each

Table 12. Summary of component data.

			Lithics											Ceramics				Fauna							Total	Comments
Component	Excavation Units		Points	Bifaces	Endscraper	Uniface	Tool Fragment	Retouched Flakes and Shatter	Core and Core Shatter	Debitage	Total	Local	Non-local	Rim	Body	Total	No. of Vessels	Bison	Canid	Deer	Other	Unidentified	Total			
VII	A																									
	B																	2				16	18	1		
	Total																	2				16	18	18		
VI	A																	2				8				
	B																									
	Total																	2				8	10	10		
V	A									1	1							4				52	56		Hearth,	
	B																								Pit	
	Total									1	1	1						4				52	56	57		
IV	A																	2				20	22			
	B								1	1	2							206	9			560	775			Late Spring
	Total								1	1	2	2						208	9			580	797	799		
III	A	540+135						1	1	24	26	22	4	2	10	12	2	63	16			416	495		Hearth,	
	B	years	7	2	1	1	1	17	4	588	621	201	420		1	1	1	279	177	3	3	1382	1844		Pit	Mid-Winter
	Total	B.P.	7	2	1	1	1	18	5	612	647	223	424	2	11	13	3	342	193	3	3	1798	2339	2999		
IIIA	A																	6				4	10			Late Summer
	B								1	5	6	6						29				31	60			or Early
	Total								1	5	6	6						35				35	70	76		Fall
IIA	A																	1					1			
	B																	5					5			Fall
	Total																	6					6	6		
II	A	615+120																2				6	8			
	B	years						1		7	8	4	4					75	1			41	117		Hearth	
	Total	B.P.						1		7	8	4	4					77	1			47	125	133		
I	A		1						9	71	81	65	16		1	1	1	34	53			65	152			
	B									1	1		1					75	1	1		467	544			
	Total		1						9	72	82	65	17		1	1	1	109	54	1		532	696	799		
	Total		8	2	1	1	1	19	16	698	746	301	445	2	12	14	4	785	257	4	3	3068	4117	4877		

site represents a unique occurrence in human history, its redundancy must be proven rather than assumed. To ground site significance in current research themes or problems would inhibit the development of archaeology. If only those sites relating to current research problems are preserved, then, as Dunnell (1982:315) notes, we ". . . will irrevocably constrain the future to conform to the present." In any case, despite several years of effort, Alberta archaeologists have been unable to define provincial research themes against which site significance could be measured. In sum, one must conclude that Donahue's system of assessing site significance cannot be operationalized. Despite this, it does have some utility in providing a conceptual framework for considering the problem.

While grand schemes of site significance assessment have proven difficult to formulate, there has been a major attempt at implementing a practical site significance scheme in the province. Ives (1985) developed site significance criteria for the Slave River Hydro Project in northeastern Alberta. Given the exigencies of the project, he approached significance within the context of current research problems. By considering the known site type data base, he could narrow the research focus to those problems which potentially could be solved. With these defined, he could specify the necessary site attributes and devise an appropriate significance ranking scheme. Thus, Ives' scheme had the virtue of practicality, buts its concomitant regional limitations preclude its general applicability.

Bobrowsky (1982) proposes a simple approach to assessing site significance which is both generally applicable and can be practically implemented. He cogently argues that the single most important attribute is site integrity. This is a measure of the degree of disturbance and preservation of the resource. As he argues, resolution of all research problems - even of problems not yet conceived - is dependent upon the integrity of the archaeological deposits. The value of his argument lies in its disassociation from current research paradigms and its simple application. However, his scheme would give equal significance ranking to an undisturbed tipi ring and an undisturbed buffalo jump. On theoretical grounds, this is probably correct. In practical terms, especially when preservation has associated land-use costs, some further consideration must be given to the quantity and quality of the data being protected.

ROSS SITE SIGNIFICANCE

Curiously, the question of the significance of the Ross site barely arose during the 1980 project. Forbis' work was considered to have demonstrated that the site was a significant historical resource. In 1980, the problem was seen as one of determining if the remaining deposits were qualitatively similar to those investigated by Forbis. If so, their significance was assumed to be identical. This assumption of significance was based on perceived merit of the site attributes as revealed in 1980 and the research potential demonstrated by Forbis (1960).

Attributes of Merit

The value of the Ross site resides in the physical nature of the deposit - stratification, integrity - and in the density, diversity and distribution of cultural remains.

The Ross site components vary in integrity. The lower layers (Components I, II, IIA, IIIA and III) were sealed by low energy depositional events and are undisturbed. The upper components (Components IV, V, VI and VII) are not so well preserved, and high energy flooding events have occurred. However, differences between the two excavation units indicate that undisturbed upper component deposits are present intermittently in the site.

Little other disturbance is visible in the site. Rodent burrows are present but do not appear to be extensive. As seen in 1980, the burrow fills are plainly visible and occupy little area; there is no difficulty in separating the disturbed burrow fills from the undisturbed component floors.

In some respects, Component III was disturbed by the cultural activities which formed the deposit. As noted earlier, the deposit represents a palimpsest, that is, a mixed accumulation of activity debris resulting from a lengthy period of occupation. Despite this, it appears that certain activity events can be seen in the pattern of debris around the features.

Stratigraphic separation of most components is good. One pit has pierced two components, and this may occur elsewhere. As well, there are indications that Component IIIA rises into contact with Component III, and separation of the occupations may be difficult in some areas of the site. However, vertical mixing between components was little problem in 1980, and this condition may exist throughout much of the site.

As has been shown, the density of cultural material varies among the components and between the excavation units. This is not unexpected; the excavation units intercepted portions of different activity areas. Since human activity is spatially structured, one would anticipate fluctuations in densities as excavation units sample different portions of the site. However, if the 1980 results approximate the remains elsewhere, then the overall material cultural density is about 610 items per square metre. Actual variation between the 1980 units (218 items/square metre in Unit A and 1001 items/square metre in Unit B) indicate that the average density calculation is a gross approximation at best. Still, when one considers that common material culture densities from tipi rings range from 0.8 items/square metre (Crawling Valley - Wright et al. 1984:403) to 9.8 items/square metre (Forty Mile Coulee - Brumley 1983:107), then some appreciation of the quantity of material in the Ross site is gained.

The diversity of cultural material in the deposits has been demonstrated. All possible classes of material except ground stone were recovered. The full range of lithic artifacts from finished tools to debitage is present. Although pottery is rare, portions of at least four different vessels were recovered. Faunal remains are dominated by bison but include a number of other species. As well, the processing of bone into beads and other tools is evident. Lithic variety is marked, with one notable source - the Knife River Flint quarries - not represented. In general, the material culture diversity in the Ross site is high, as one would expect at a campsite.

Lastly, the distribution of cultural material indicates a high value site. As has been shown, primary activity areas are present and analysable. As well, material cultural remains can be related to occupation features to devise some reconstruction of life in the campsite. One can anticipate that this situation will obtain in the unexcavated portions of the site.

In summary, the Ross site as examined in 1980 is a high value campsite. It contains diverse cultural material in high density and a variety of features from diverse activity areas. Stratigraphic separation is good, and site disturbance is minimal. Preservation of organics, including bone, charcoal and plant remains, is good. While the 1980 excavations sampled only a very small portion of the site, they indicate that the deposits are of similar quality to those uncovered by Forbis (1960).

Recommendations

At the conclusion of the 1980 field season, it was apparent that the Ross site remained a significant historical resource. Despite extensive erosion following Forbis' excavations, the remaining deposits appeared to be of similar quality. Although the excavation strategy precluded determination of site limits, the deposits in Unit B, some 50 m back from the riverbank, were commensurate with those described by Forbis (1960). The cutbank exposure also remains similar to that observed by him in 1957, both in terms of area of exposure and quantity of material exposed. For these reasons, it was recommended that the Ross site, DlPd-3, be designated a Provincial Historical Resource under Section 16 of the Historical Resources Act, Chapter H-8, Revised Statutes of Alberta, 1980.

Subsequent to this recommendation, a designation data package was prepared and submitted for consideration to the Minister of Culture and Multiculturalism. The Ross Archaeological Site was designated on January 7, 1981. The River Engineering Branch of Alberta Environment undertook to protect the site from further erosion. This involved extensive bank armouring including a 2-3 m packed gravel fill with an appropriate riprap armoured apron. This work was conducted most professionally with no damage to the cutbank or the archaeological deposits. To date, no further erosion has occurred.

CONCLUSIONS

Selection of the Ross site locale by the Plains Indians was dependent upon access to seasonally available resources within the settlement round. Site seasonality data were recovered for four of the components. At least one (Component III) can be assigned to mid-winter, and the density of cultural material suggests that one other (Component I) might belong to the same season. However, as Forbis (1960:121) noted earlier, the valley's resources would have encouraged use of the locale in other seasons. Seasonality data from the 1980 project indicate use in the late spring (Component IV), late summer-early fall (Component IIIA) and fall (Component IIA). The site should be viewed within the context of the seasonal round; the seasonally diverse occupations reflect scheduling choices made by the prehistoric people of the region.

Seasonal resource availability placed constraints upon the aggregation of the human population. It is reasonable to assume that social organization reflects adaptive mechanisms designed to cope with those constraints. In the Plains generally, the band system appears to be a virtually universal organizational structure (see Lowie 1954:92). As Oliver (1968:251) notes, "The characteristic band organization of the True Plains tribes was a logical outgrowth of the ecological circumstances within which the tribes lived."

Such bands are best considered residential groups rather than descent groups. The nature of these bands is clearly explained by an unknown Peigan cited by Wissler (1911:19):

> A man may go into another band and live there if he choose, nothing much being said about it. Sometimes a man may not like the chief of his own band and so go to another. . . . For a time, it may be thrown out to him that he belongs elsewhere but after a while he is always spoken of as a member. When a band begins, it may be a group of two or three brothers, fathers, and grandfather . . . later, friends or admirers of the head man in this family may join them until the band becomes very large. Bands may split in dissension, one part joining another or forming a new one.

The fluid composition of such bands would have provided adaptive advantages - adjustment of group size to resource availability and the resolution of intra-group conflict by fission (Lee and DeVore 1968:8) - which might have been unavailable in strongly kin-based residential units (see Oliver 1968:252; cf. Ewers 1958:9, 96). Such composite residential bands are suggested by Reeves (1983:188) for the Pelican Lake, Besant and Avonlea phases and seem likely for Old Women's Phase peoples.

Band size among the Blackfoot in the mid-nineteenth century ranged from 10 to 36 lodges or 80 to 288 people (at eight persons per lodge) with an average of about 25 lodges or 200 persons per band (Ewers 1958:97). For the prehistoric period, Ewers estimates:

> Each band probably comprised about twenty to thirty families, totaling some one hundred to two hundred men, women, and children. These bands were large enough to enable their members to encircle a small herd of buffalo on the prairie and large enough to offer a stiff defense against human enemies; yet they were small enough to permit survival during periods of game scarcity and limited rations (Ewers 1958:9).

This band of a nominal 25 lodges constituted the basic adaptive unit for the exploitation of seasonally available resources.

The seasonal round of the historic Blackfoot has been described by Ewers (1958:88). He considered that each band wintered separately. The winter camp was established in October-November and occupied until March-April. Such camps were situated in river valleys where shelter, wood, water and forage were available. In March, the bison left the valleys, and the bands either followed or, presumably in years of poor weather, were forced to subsist on small game. The period from March-April through June saw the bands separately pursuing the bison on the plains.

Sometime in late June-July, the bands would begin to gather for the tribal summer hunt and to secure bull tongues for the Sun Dance. This ceremony occurred when the Saskatoons were ripe in late July or early August. By the end of that month, the bands again separated to conduct their fall hunts. Bison processing and pemmican preparation continued until the winter camp was again established in October-November.

This classic reconstruction of the seasonal round was presented by Ewers (1958) in the style of traditional ethnology, but there is no doubt that Ewers was aware of the major influence of bison hunting on the human round. In a more explicitly cultural ecology framework is the analysis by Oliver (1968). He examined the data on bison ecology and related the human adaptation directly to the bison:

> The Indian tribes had to be dispersed in winter and concentrated in the summer. The buffalo were too scattered in the winter months to permit large numbers of people to band together, and the opportunities provided by the dense herds in

> the summer months were too good to miss, since food was stored at this time for the rest of the year. Morever [sic], the compact summer herds drew the Indians together for the simple reason that large parts of the buffalo range were without buffalo at this time (Oliver 1968:247).

Thus, according to Oliver, only with the concentration of bison during the summer rut - a concentration resulting in much of the range being unoccupied by the animals - were the Plains Indians organized into tribal or linked-band concentrations.

It is, perhaps, appropriate that this reconstruction of the seasonal round was first attacked through a reconsideration of bison ecology. Arthur (1975) critically examined both current bison herd studies and historical accounts from the fur trade era in the Canadian West. He concluded that ". . . not only did the individual herds tend to become larger during the winter, but the autumn influx of bison herds into the wintering areas formed the large aggregate herds that wintered in those areas of lush or available vegetation" (Arthur 1975:60). He further assembled historical accounts to indicate that bison drives (pounds) operated throughout the winter and that camps of 200 to 300 lodges (1600-2400 persons) could be supported. Thus, the classic ethnological view that the Plains Indians wintered in dispersed bands was shown to be not necessarily true.

Arthur's student, G. Morgan (1979, 1980) has pursued the problem of bison ecology further. She especially considered forage quality - the seasonal structure of growth and curing of various grass species - as the trigger for bison movement. From this, she reconstructs the prehistoric human annual round (Morgan 1979:175ff):

(1) In spring (April) the herds left the parklands and valleys attracted by new spring grasses on the uplands; this would have resulted in a game scarcity in the winter camp area unless the grasses had been fired during the previous autumn and spring growth enhanced. Assuming that was done, the herds should have remained in the vicinity and communal hunts would have continued. During this period, the winter camp was abandoned due to excessive moisture, but the people moved only to adjacent high terraces or valley rims.

(2) The bison moved to the summer range in early May, drawn by Bouteloua growth. For humans living in the valleys in the summer range area,

following the animals was no problem. For those wintering further north in the parklands, dried provisions were necessary for the trek to the summer pastures.

(3) From mid-May until the height of the rut in mid-July to mid-August, resources were adequate for the human population ". . . to maintain a relatively sedentary life style and to preserve the pre-horse period group of a size necessary to operate a bison drive effectively" (Morgan 1979:177).

(4) During the rut, mid-July to mid-August, communal hunting was impossible. This, the disappearance of surface water and the ripening of berries initiated human movement back to the wintering areas. Dried provisions and alternate game species were drawn upon for sustenance. Some bison were present in those areas, however, and individual hunting did occur.

(5) From late fall until the first snows, large herds drifted into the winter range and intensive bison drive activities occurred. Presumably, the animals were drawn by water supplies. Except for a short period when snow melt recharged surface water and the bison moved back onto the plains, the herds remained in the wintering areas and were hunted communally.

In more general terms, Morgan concludes:

> As a result of the above dynamics, certain patterns of human behaviour evolved: (a) the people were able to continue traditional communal hunting techniques during most of the year; (b) with the exception of major movements between the summer and winter range, human populations were able to remain relatively sedentary during most of the annual life cycle; (c) the individual group size, that is, the number of individuals necessary to effectively operate a drive, could be maintained on a year-long basis (Morgan 1979:183).

There are obvious differences in both the period(s) of communal hunting activities and in population aggregation estimates between the current models. The historic period summer communal hunt would seem to be a recent development based on the use of horses in the chase. It would seem reasonable that, while the bison were in rut, traditional pedestrian communal hunting techniques (surround, pound, jump - see Verbicky-Todd 1984:33-158) would not work well. As Frison (1978:250) notes, during the rut ". . . there is little possibility of success in driving, corralling or otherwise working with the herd." Assuming the Indians made rational decisions, one should not expect prehistoric communal hunts in the high summer. Without such hunts, it would be difficult or impossible to hold tribal level population aggregates together. This has important implications for the conduct of rites of intensification, such as the Sun Dance; neither the required bull tongues nor the population aggregates would be attainable. If correct, one would anticipate a distinct shift from the ceremonial calendar noted for historic period tribes.

To summarize, the ethnographic models of Ewers (1958) and Oliver (1968) contrast with the seasonal round population aggregation models of Arthur (1975) and Morgan (1979). Bison behaviour and the efficacy of pedestrian communal hunting techniques form the points of departure. The classic reconstruction sees a major aggregation of bands during the summer, with the bands dispersed during the rest of the year. As well, extensive communal hunting is seen as a band activity pursued throughout the fall to secure dry meat stores for the winter. In contrast, the Arthur-Morgan models reject summer communal hunting, due to erratic behaviour of the bison during the rut, and postulate continuous communal hunting throughout the rest of the year, except for a brief period after the first snows. While Arthur indicates multiband population groups in winter, Morgan merely states the groups were large enough to conduct communal kills. Whether she conceives of these as band or multiband units is unclear. Lastly, Morgan postulates rather greater sedentism than do the ethnographic models.

Component III in the Ross site has been identified as a mid-winter occupation, based on at least two early foetal individuals. The presence of bison skull remains, which were seldom taken far from the kill, indicates that bison hunting occurred during winter in close proximity to the camp. The quantity of bone recovered, and Forbis' (1960:121) discovery of the Lower Kill (DlPd-2) about 1 km from the Ross site, indicate that communal hunting might have occurred. Since the area investigated in 1980 yielded relatively little fire-broken rock in comparison to processing camps such as Head-Smashed-In (Brink et al. 1985, 1986), it seems unlikely that a major effort was devoted to producing dry meat and pemmican stores at the Ross site itself (see

Reeves 1986). In other words, the current evidence from Component III seems consistent with Arthur's (1975) view that major winter camps could be supported by continuous communal kills.

Unfortunately, it is not possible to estimate the human population during the Component III occupation; however, the known site size (205 x 50 m = 10,250 m^2) would accommodate some 366 six metre diameter lodges packed cheek to jowl. I do not mean to suggest that these figures are real, but I would suggest that the Component III occupation is larger than one would expect from a 25 lodge band. Again, this would seem to support Arthur's model of population aggregation at some winter campsites.

If it was necessary to abandon the Ross site terrace in spring due to excessive moisture is unknown. Presumably, some years might have necessitated such a move, while other years may have seen dry conditions. Two campsites, DlPd-5 and DlPc-4, are known on prairie level south of the Ross site, and another, DlPd-10, is present on the north rim of the valley. All sites have yielded ceramics, and DlPd-5, directly south of the Ross site, is an extensive, multicomponent camp which contains Oxbow, Avonlea and Old Women's Phase material (Judith Nickol, personal communication 1986). Of course, one cannot say on the basis of current data that these are spring camps; one can only say that the possibility exists.

The Ross site itself yielded an apparent late spring occupation - Component IV. Unfortunately, the Unit A assemblage is meagre, while that in Unit B is flood disturbed. Other than to suggest that the occupation is less intensive than the mid-winter Component III occupation, there is little one can conclude from these data.

The Little Bow site, EaPh-4, about 65 km northwest of the Ross site, is considered to be a late spring campsite on the basis of foetal bison remains (Fedirchuk 1986:85). The site contains two Late Prehistoric occupations dated 620 ± 230 years B.P. (AECV 153c, Carmangay component) and 450 ± 70 years B.P. (AECV 154c, Vulcan component), which is roughly contemporaneous with the Ross site (Fedirchuk 1986:86). The site is situated on a very high terrace which slopes down from prairie level and overlooks the Little Bow River valley to the south and east. Dawson described the area:

> The valley of the Little Bow . . . is about a mile wide and one hundred feet deep, while the stream, where rapid, is ten to fifteen feet wide only, but frequently forms long sluggish pools of greater width . . . (from Mosquito Creek) to the Belly River (i.e., the Oldman River), the Little Bow continues to occupy a large flat-bottomed valley of similar character, and pursues a very tortuous course in it. There is no wood whatever in the Little Bow Valley (1884:27; brackets mine).

The area is not likely to have contained a winter camp, so the Little Bow site must represent a camp locale some days trek from winter quarters.

EaPh-4 yielded over 600 potsherds, a large recovery for Alberta sites. The density of lithic and ceramic remains at the Little Bow site, about 21 items/square metre, is much less than the Component III mid-winter assemblage from Ross, about 83 items/square metre. It is not possible to compare faunal density due to the rather poor preservation of the EaPh-4 sample. The quantity of material and the size of the site suggest at least one band was camped there for some considerable time. It is not possible to estimate accurately the length of occupation, but a duration of several weeks would not seem unreasonable. It therefore seems possible that, upon the abandonment of winter quarters, the band(s) made a short move to drier areas and geared-up for the summer season. This is consistent with Morgan's (1979) reconstruction of the seasonal round.

Excavations at the Fort MacLeod kill and processing camp, DkPi-2, also shed light on spring activity (Reeves et al. 1981). This site is situated on a terrace somewhat higher than the Ross terrace, on the south side of the Oldman River about 70 km west of the Ross site. Although only a small area was investigated, the site is thought to extend for over 4 km. It consists of a series (?) of bison kills along the base of the valley rim and associated processing camps at the front of the terrace. Six occupations were sampled of which the upper three are Old Women's Phase. Dates of 410 ± 160 years B.P. (RL-1507) and 510 ± 110 years B.P. (RL-1506) are reported for Occupation 3 (Brumley and Rushworth 1983:151).

The faunal analysis was able to identify seasonality for Occupations 3, 4 and 5; the upper levels - Occupations 1 and 2 - did not yield sufficient bone material to assess seasonality. A term foetus and a newborn calf from Occupation 3 indicate site use in April-May:

> The significance of this activity in the spring as identified at DkPi-2 and its continuity through time at this locale suggests a major seasonal focus in spring, perhaps to lay in stock stores prior to the late spring dispersal of the bison into the summer range and coming rut (Reeves et al. 1981:60).

The authors also note the contrast with the classic seasonal round reconstruction and its emphasis on the fall hunt.

The Fort MacLeod kill/camp, DkPi-2, is not the only large spring kill known. The Gleichen Jump, EfPg-2, contains a spring use event (John Brumley, personal communication 1986), and similar kills supplied the camps at the Hartell Creek site, EgPi-1, Areas A and B (Murray et al. 1976) and the Balzac site, EhPm-34 (Head 1986). Thus, it would appear that band or multiband camps and kills commonly occurred during the spring calving season.

Summer (late June-August) sites are much more difficult to identify on the basis of seasonality indicators available in the archaeological record. At least in the early part of the summer, perhaps to mid-July, the Indians probably were very mobile, and sites should contain limited cultural material. It is at this time that sites located well out on the plains were probably occupied. Presumably, the ubiquitous tipi ring site represents this time of year. Such sites are very often situated in locales of little deposition, and faunal remains are seldom preserved.

Brumley et al. (1982) model aboriginal utilization zones in relation to landform. Of interest here are their "Open level to Gently Rolling Prairie Zone" and "Open Moderately to Strongly Rolling Prairie Zone," which I shall refer to as Level Prairie and Rolling Prairie, respectively.

The Level Prairie zone is usually composed of ground moraine or glacial lake deposits - it can be painfully flat. This zone contains only rare and short-lived meltwater ponds (sloughs), but it often provides rich grazing for bison. The topography is not very good for pedestrian hunting - there is no cover - and archaeological sites occur in only low density (Brumley et al. 1982:54). For example, in a survey of 181 square miles of prairie lands on the Suffield Military Reserve, Brumley and Dau (1985:163) calculate an average site density of 4.89 sites/square mile. Measuring topographic rugosity through the simple expedient of counting 25 foot contour lines within quarter sections (note that equal elevation contours are counted separately and rugosity rather than total vertical relief is being measured) reveals a strong correlation between site density and relief. The most level terrain (1-5 contours) has a site density of 0.12 sites per square mile, whereas strongly rolling terrain (51-55 contours) yields a mean of 28 sites/square mile. The latter terrain, the Rolling Prairie zone, contains numerous meltwater ponds and good cover for game stalking (Brumley et al. 1982:55).

In another study, Brumley (1983:79) records the number of tipi rings per site in a sample from southeastern Alberta consisting of 95 sites containing a total of 653 tipi rings. Fully 59 percent of the sites contain three or fewer tipi rings. Only 27 percent of the sites contain 10 to 36+ tipi rings; that is, only 27 percent fall within the recorded lodge numbers of historic Blackfoot bands (Ewers 1958:97). If these sites do represent early summer camps, then the bands themselves must have dispersed into family groups during this season. As an adaptation to the difficulty of communal hunting during the rut, this pattern makes good sense. Although the bison cannot be driven, their concentration on proclivity activity may have made them unwary and vulnerable to stalking. The higher density of tipi ring sites in hummocky terrain may reflect such hunting techniques.

As noted, it is as yet impossible to get a precise indication of season of use in most archaeological sites located on the prairie lands. On logical grounds, the limiting factor should be the availability of water. It must be remembered that the problem would have been exacerbated in the prehistoric period by the necessity of watering the dogs. One can also hypothesize, as Morgan (1979) also models, that the area would have insufficient water by mid-summer. Water supplies would presumably decrease in the Level Prairie zone first.

In the Suffield study referred to earlier, another strong correlation to topography exists - distance from the South Saskatchewan River. Indeed, it appears that even landscape rugosity is over-ridden by this attribute. Although the average site density for the Suffield Military Reserve is 4.89 sites per square mile, that area 0 to 1 mile from the valley rim shows a density of 21.54 sites per square mile. After 2.5 miles, the site density falls below the Suffield average (Brumley and Dau 1985:165).

This distribution pattern is well known among Alberta archaeologists. Indeed, ring features can become so common that site definition becomes difficult. For example, Adams (1976:6) defined site boundaries by arbitrarily selecting a 100 m distance to the next cultural feature, or a recognizable topographic break, as his site limit criteria. Of course, it is entirely possible that a single occupation could encompass several topographic features, and this attribute is also arbitrary.

Even when features occupy the same landform and are closely spaced, demonstrating that they represent a contemporaneous occupation remains extremely difficult. For example, site DjPb-2, located on a narrow spur above Chin Coulee and separated from the plains by a narrow 10 m wide ridge, contains 41 tipi rings (Calder 1979). Examination of the feature plans and the oblique airphotos of the site (Calder 1979:63) indicates that ring rock robbing and feature superimposition occur. That the features are not contemporary was confirmed by excavations; cultural material indicates site use from the Old Women's Phase to the Oxbow Phase.

Although no large Old Women's Phase tipi ring sites have been investigated, Quigg (1986) presents reasonable arguments that 15 of 18 tipi rings at the Ross Glen site, DlOp-2, represent a single event Besant Phase occupation. This site is located in Medicine Hat on prairie level adjacent to Bullshead Coulee which contains a permanent stream. The pattern of rings suggests to him that ". . . two groups or bands occupied the site simultaneously and that the arrangement of tents within these groups was based on relationships among individuals and/or families within each group" (Quigg 1986:133). However, other than to note that the locale is too exposed for a winter occupation, no seasonality data were obtained. While Quigg (1986:125) suggests a fall occupation on the basis of Ewer's (1958) descriptions of the historic Blackfoot round, the site could have been occupied during any part of the warm season. The site thus illustrates the difficulty of establishing seasonality even when one can reasonably reconstruct feature contemporaneity.

To summarize, we have evidence that multiband winter camps were abandoned in early spring for drier terrain. Communal bison hunting also occurred at this time. Following this period, it appears that at least some bands broke up into family groups which stalked bison in broken terrain while surface water supplies were available. If such locales were indeed abandoned by mid-summer, we lose track of the next portion of the round. The high site density near river valleys may support Morgan's (1979) contention that the people returned to permanent water supplies; however, we are unable to identify site seasonality with sufficient exactness to demonstrate this proposition. As well, due to the difficulty of determining feature contemporaneity, we are unable to say whether the population was dispersed into family groups or aggregated into band or tribal units.

Component IIIA at the Ross site is thought to represent a late summer to early fall occupation on the basis of toothwear. Although bison were obviously taken and marrow extraction occurred, there are few other data. As sampled in 1980, the occupation appears minimal, suggesting a small group size and/or a limited duration of use. Exploitation of riverine resources - especially berries - is likely but cannot be demonstrated. The limited evidence does not suggest that alternate prey species to bison were being hunted; however, this need not negate Morgan's (1979) model, since she allows isolated bison hunting at this time. Of course, the riverine environment could have been exploited from a prairie level campsite, so the Component IIIA remains do not necessarily indicate the intensity of valley use during this season.

Later in the fall, perhaps in October, the fall hunting season began. At this time, large communal kills to secure dry provisions for winter emergencies are postulated in most ethnographic and historic accounts (see Verbicky-Todd 1984:34ff). Frison (1978:345) also subscribes to this concept. Indeed, with the exception of a single spring kill event at the Vore site, Frison assigns the Late Prehistoric Wyoming kills (Wardell, Glenrock, Big Goose Creek, Piney Creek and Vore sites) to the fall (Frison 1978:227-242). Arthur (1975:113-118) disputes the seasonality methodology used by Frison. He also disputes the necessity for procuring dry meat stores in the fall but does not, of course, deny that fall communal hunting occurred (Arthur 1975:106). In my opinion, Arthur overstates his case, and I suspect that any prehistoric population which was so improvident as to neglect production of fall dry meat provisions would rapidly find its way into the archaeological record. In the northern Plains, neither the weather nor bison movement patterns were sufficiently predictable to neglect such preparations (Hanson 1984:102; Roe 1951:393; cf. Morgan 1979:225).

At the Ross site, Component IIA was assessed as a fall occupation; however, so little material was recovered that further interpretation is not possible. If a major effort was devoted to securing a dry provision store in fall for the Component III winter camp, then much of the processing activity may have occurred at the Lower Kill (DlPd-2) itself rather than in the Ross camp site. At Head-Smashed-In, the processing camp at the base of the kill area is unsuitable for winter camping, and the processed products from the kill must have been transported elsewhere, assuming a major fall kill occurred there. Presumably, a similar circumstance occurred at the Lower Kill - Ross site complex.

Only two major bison jumps have been excavated in Alberta: the Old Women's Buffalo Jump, EcPl-1 (Forbis 1962), and Head-Smashed-In Buffalo Jump, DkPj-2 (Brink et al. 1985, 1986; Reeves 1978). While seasonality was not determined at the Old Women's site, it was for four of eight Old Women's Phase cultural units at Head-Smashed-In (Lifeways of Canada 1979). Two (units 2 and 6) are assigned to summer and two (units 1 and 8) to summer-early fall. These suggest the jump was used during the rut. This is contrary to Frison's (1978) contention that drives were unlikely during the rut and to the seasonality determinations for other communal kills. Since the herds are assessed as normal cow/calf groups rather than mixed herds which are typical of the rut period, it is difficult to accept the seasonality ascription. If correct, the Head-Smashed-In data suggest the model followed in this paper is in error. While fall communal kills such as EfPm-27 at Fish Creek in Calgary (Crowe-Swords and Hanna 1980) are known, it is as yet impossible to evaluate the frequency and intensity of fall bison killing in comparison to other seasons.

The use of the Ross site in winter resulted in the dense deposit designated Component III. While this component is particularly impressive, one must not neglect to note that it is also unusual. That is, in the last +600 years, the site was used as a major winter camp locale only once or twice. Even acknowledging that intensive archaeological survey of this reach of the Oldman River has not been done, and that there is no way of knowing if other comparable sites have been destroyed by river erosion, the apparent infrequency of use requires some comment.

I have argued elsewhere that Arthur (1975) and especially Morgan (1979, 1980) have over-emphasized the predictability of bison movement patterns (Vickers 1986b). As Hanson notes for North Dakota:

> The fact that Indians or other experienced bison hunters (such as the Metis) employed "predictive models" of where bison were expected to be was no assurance of success. The nomadic strategy, meat preservation and storage technology, wide-ranging scouting parties, elaborate buffalo calling ritual, and other well-known customs related to bison hunting can be viewed as responses by experienced native hunters to the uncertain nature of bison movement and availability (1984:102).

Thus, while there may be trends in seasonal bison movement from the plains in summer to sheltered river valleys or foothills and parkland areas in winter, the appearance of bison herds at specific locales such as the Ross site was not a predictable event.

Jochim (1981) models cultural behaviour within an environmental context, and his view of general hunter-gatherer settlement systems is relevant here. He suggests:

> Fixed resources are more important to settlement decisions than are mobile ones. Fixed resources are predictable in space and thus more reliable to procure. Consequently, hunter-gatherers tend to locate their camps where water, firewood, and plant foods are available and to exploit these resources within a small radius of camp. Mobile game animals, by contrast, rarely determine the specific camp locations, although ideally, hunting areas will also be accessible from settlements and hunting activities will be conducted over a wider area from camps (Jochim 1981:153).

I have argued that of all fixed resources firewood was the most critical factor governing winter campsite selection (Vickers 1986b).

As noted earlier, the Ross site locale is the only one in this reach of the Oldman River with an abundance of wood. Even if frequent prairie fires and bison trampling reduced the amount of wood in the area, I doubt that the locale was ever completely denuded in the Late Prehistoric Period. Conceivably, the dead wood which was selected for firewood might have been exhausted for a few brief years, but this can hardly account for single winter use event in the 600 year period. As well, the tree stands capture large amounts of driftwood during flooding events, and one can reasonably assume that adequate firewood supplies were often available at the Ross site locale.

Why then were winter occupations so infrequent? I would suggest that the isolation of the Ross area from other suitable winter camping locales increased the risk of camping there. Should there have been a failure of resources of any sort, relocation might have been a hazardous task. The nearest other wood, and hence the nearest area where another band might winter, is about 35 km westward in the Lethbridge area. To the east, there is no wood for at least 60 km. A march of several days across the plains in winter, especially if the people and dogs were starving and the weather uncertain, is a desperate thing to contemplate. In this regard, it is interesting to note that the Component III winter camp dates sometime between roughly A.D. 1300-1550 and that the site was not used subsequently in the winter. The period from A.D. 1645 to A.D. 1723 corresponds to the so-called Little Ice Age in Europe (Lamb 1972:22), while a date of 450 ± 150 years B.P. on a tree over-run by the advancing Robson Glacier (Luckman and Osborn 1979:65) might indicate climatic deterioration in the Rocky Mountains. Although highly speculative, one might suggest there was more severe weather on the plains in post-Component III times. If so, perhaps the risks outweighed the advantages of the Ross site locale, and the people chose to camp elsewhere. The upper Belly River area with its continuous tree stands may have seemed a better bet; certainly Quigg (1974) found many winter camps in that locality.

Lastly, one should consider the event that led to the Component III winter camp, an occupation which represents an unusual use event in the history of the Ross terrace. I suspect that the key lies in the Lower Kill. Perhaps one fall, several bands moving westward encountered numerous bison herds and were able to conduct a major kill. Burdened with a sudden weight of riches, secure with meat stores sufficient for a long winter, and in proximity to wood and shelter, there may have been no need to continue further. The fact that they apparently had a decent winter and were able to continue supplying the camp with fresh meat in no way negates the importance of a major fall kill in the decision to remain. Minimally, this event must have occurred or there would be no

Component III. If there were additional social or security reasons for the choice will never be known.

CONCLUDING REMARKS

The Ross site contains material from several seasonal occupations during the Late Prehistoric Period. Its main use event as a winter campsite was an unusual event, probably related to a particularly successful kill. Occupation in other seasons occurred but precisely how these fit into the normal Late Prehistoric seasonal round is difficult to evaluate. Conflicting models exist for the seasonal settlement pattern, and these cannot be resolved. Of particular interest are the timing and degree of population aggregation and dispersion in the spring and summer seasons and the extent of fall dried meat preparation. These problems also bear upon the timing of ceremonial calendar events and issues of security and conflict within the Late Prehistoric Period. While the ethnographic models have been shown to be inadequate, and ecological arguments have been developed, archaeology has as yet been unable to detail the seasonal round. That this problem has not been resolved for the recent past bodes ill for modeling seasonal settlement patterns in earlier periods. Yet it is, perhaps, to the credit of the discipline that the constraints of the ethnographic present are being broken, and new insights into the past are being generated. The Ross site, DlPd-3, protected under the Historical Resources Act and through the care of the Nickol family, will remain available for future research on these and other problems of the Late Prehistoric Period.

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APPENDIX 1: ARTIFACT ANALYSIS

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LITHIC ARTIFACTS

INTRODUCTION

Thirty-five stone artifacts and 736 pieces of debitage were recovered from DlPd-3. For the purpose of this report, the term "artifact" refers to all formed and/or utilized lithic remains, while the term "debitage" includes all waste products. Classification and description of the lithic materials generally follow the methodology developed by Reeves (1970), with those from each level considered as discrete assemblages. Table 13 relates artifact type to provenience (by excavation unit and component), and Table 14 relates lithic types to provenience (again by unit and component). Table 15 lists the significant projectile point measurements.

The category of projectile points, which includes fragments, consists of bifacially flaked Late Prehistoric side-notched specimens. Most of these were recovered from Component III of Unit B. The points were classified according to formal aspects: body outline, edge configuration, shoulder shape, basal edge shape, notch shape, base shape and modification. The typological classification designed by Forbis (1962) was used whenever the appropriate attributes were present.

Bifaces are tools which were probably used for cutting purposes. They were made on flakes and exhibit primary and secondary flaking on a major portion of both surfaces (Reeves 1970). In this report, attributes of form, such a body outline and lateral edge shape, and size were considered in defining biface types.

The uniface fragment is defined by major flake removal on one face to thin and shape.

The category of endscrapers, as defined by Reeves (1970), is comprised of unifacially flaked tools which exhibit a working edge at the

Table 13. Lithic artifact types by component.

	Projectile Points	Bifaces	Uniface	Tool Fragment	Endscraper	Marginally Retouched Flakes	Marginally Retouched Shatter	Utilized Flakes	Utilized Shatter	Core Fragment	Core Shatter	Platform Preparation Flakes	Primary Decortication Flake	Secondary Decortication Flakes	Bipolar Split Pebbles	Secondary Flakes	Thinning Flakes	Biface Thinning Flakes	Retouch Flakes	Flake Fragments	Shatter	Broken Pebble	Total
Unit A - Component I	1										8					3	3		10	1	54	1	81
- Component III						1					1		1	1		2	3		1	3	13		26
- Component V																					1		1
Unit B - Component I																		1					1
- Component II						1											2				5		8
- Component IIIA														2	1	1				1	1		6
- Component III	7	2	1	1	1	6	1	8	2		3	1		5	1	19	106		106	120	231		621
- Component IV											1			1									2
Riverbank Profiles	3									1	2	1		2	1	2	3		2	3	16		36
Total	11	2	1	1	1	8	1	8	2	1	15	2	1	11	3	27	117	1	119	128	321	1	782

Table 14. Lithic types by component.

	Local Cryptocrystaline							Non-local Cryptocrystaline															Micro-Crystaline	Other			
	Pebble Chert	Swan River Chert	Petrified Wood	Silicified Mudstone	Silicified Siltstone	Quartz	Limestone	Chalcedony	Montana Chert	Red-Brown Chert	Milky White Chert	Milky White Dendritic Chert	Fine Grade Brown Chert	Poor Grade Brown Chert	Avon Chert	Unidentified Grey Chert	Unidentified Black Chert	Unidentified Light Brown Chert	Obsidian	Argillite	Chert Grade Argillite	Porcellanite	Quartzite	Argillaceous Sandstone	Sandstone	Ironstone	Total
Unit A - Component I	3	35	3	1		1	1	1	1					1					11		2		4		17		81
Component III		11	4		1			1	3														5	1			26
Component V																										1	1
Unit B - Component I																1											1
Component II		2	2						1								1		2								8
Component IIIA		3																					1	2			6
Component III	1	143	17	11	9	3	1	31	21	10	14	6	1		2	44	14	7	263	2		5	8	8			621
Component IV		1																					1				2
Riverbank Profiles	1	6	6		1		2	1		1	1					3			7			2	2		3		36
Total	5	201	32	12	11	4	4	34	26	11	15	6	1	1	2	48	15	7	283	2	2	7	21	11	20	1	782

Table 15. Projectile point metric observations (mm).

Provenience	Catalogue Number	Lithic Type	Portion	Length	Body Width	Height of Neck Width	Height of Base Width	Height of Basal Edge Left	Height of Basal Edge Right	Notch Opening Left	Notch Opening Right	Thickness	Body Weight (g)
Unit A - Component I	2160	Swan River chert	base	n/a	n/a	10.4	17.3	6.1	4.5	n/a		3.4 (at stem)	0.6
Unit B - Component III	2531	Montana chert	complete	21.8	11.4	7.1	12.6	5.2	3.0	4.0	3.9	3.8	0.9
	2467	obsidian	complete	17.4	12.1	7.4	12.7	4.5	3.4	2.5	3.2	3.1	0.6
	2525	obsidian	complete	19.9	13.7	9.8	14.2	3.8	3.5	2.3	2.8	3.7	0.9
	2515	Swan River chert	complete	19.1	11.5	7.4	13.1	6.7	3.9	2.7	3.5	3.6	0.8
	2492	fine grade Brown Chert	tip	n/a	12.5	n/a	n/a	n/a		n/a		3.7	0.7
	2505	Swan River chert	body	n/a	15.3	(9.4)	n/a	n/a		n/a		4.2	1.9
	2533A	obsidian	incomplete base	n/a	n/a	7.3	n/a	n/a	3.2	n/a		2.7 (at stem)	0.2
Riverbank Profiles	2963	obsidian	incomplete base	n/a	n/a	n/a	n/a	n/a	3.2	n/a		3.0 (at stem)	0.3
	2962	obsidian	base	n/a	n/a	9.4	16.3	6.6	6.9	n/a		3.5	0.5
	2912	obsidian	edge fragment	n/a	n/a	n/a	n/a	n/a		n/a		n/a	0.1

distal end oriented transversely to the longitudinal axis. Flaking may extend down the lateral margins. The working edge angle is usually steep (at least 60^{0}); use wear, if present, is located on the dorsal surface. Aspects considered when defining endscraper type include body outline, transverse and longitudinal section, presence or absence of dorsal modification, location of retouch, and present or absence of proximal thinning.

Marginally retouched flakes and shatter display deliberate unifacial or bifacial edge retouch in a patterned manner.

Utilized flakes and shatter have nibbling, grinding, crushing or step fractures along the marginal edges as a result of use.

Core fragments and shatter exhibit platform preparation (crushing) where flakes have been driven off. Additionally, core fragments display negative bulbs of percussion, bulbar scars, etc.

Platform preparation flakes exhibit grinding or crushing on the proximal end where they have been driven off once the striking platform had become exhausted.

Primary decortication flakes have complete cortex on the dorsal surface while secondary decortication flakes have some cortex, as well as scars from previous flake removal. Decortication flakes represent initial cobble reduction prior to actual tool production.

Bipolar split pebbles or cobbles exhibit crushing on opposite ends with bulbs of percussion present at one or both ends of each fragment.

Flakes which lack cortex and have scars from previous flaking on the dorsal surface are termed secondary flakes. They were deliberately produced for immediate use, for further modification, or to thin and reduce a core tool.

Thinning flakes, as defined by Reeves (1970), represent initial biface or uniface tool production and are identified on the basis of curved longitudinal sections and lack of use wear on the platforms. They are often blade-like in form and have multiple flaking scars on the dorsal face. Some of the specimens closely resemble secondary flakes or retouch flakes since this category represents a midpoint in the continuum of tool reduction.

Biface thinning flakes are defined as having a faceted platform and a faceted (flake-scarred) dorsal face. Use wear may be visible on the platform.

Retouch flakes are small flakes driven off from the edge of dulled bifacially or unifacially worked tools in order to sharpen the edges. They are generally small, tear-drop in shape with curved longitudinal sections and faceted overhung platforms.

The category of flake fragments includes proximal, distal and midsection fragments of mainly secondary flakes. If specimens were obviously thinning or retouch flake fragments, they were included in those respective categories. Flake midsections and shatter were often difficult to differentiate.

Lithic debitage that was blocky/irregular/angular/tabular and lacked diagnostic flake features (striking platforms, bulbs of percussion, feathered edges) was termed shatter.

Lithic raw material types have been divided on the basis of differences in colour, texture, lustre and inclusions into categories of "local cryptocrystalline," "non-local cryptocrystalline," "microcrystalline" and "other."

COMPONENT I

Excavation Unit A

Projectile Points (n=1; Figure 28)

Type

Plains Side-notched, possibly Pekisko Variant

Form

The specimen has been transversely truncated across the stem; only the base remains. It is biconvex in transverse cross section. Basal edges are slightly contracting with one edge straight and the other rounded. The notches appear to have been widely U-shaped. The base is concave.

Metrics

Length	n/a

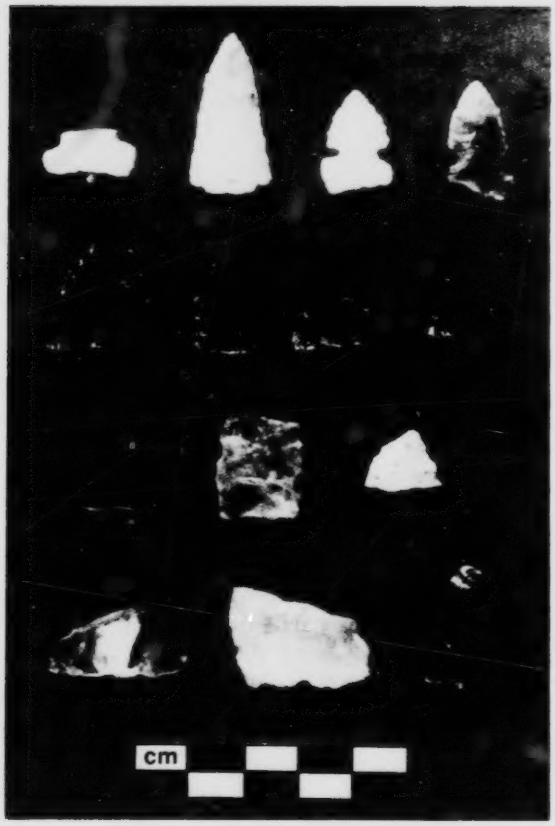

Figure 28. Lithic artifacts: projectile points (a-i), biface fragments (j, k), endscraper (l), tool fragment (m), uniface (n); provenience: Unit A, Component III (a), riverbank profiles (g, h), Unit B, Component III (all others).

Neck width	10.4 mm
Width at base	17.3 mm
Thickness at stem	3.4 mm
Height of basal edge	6.1-4.5 mm

Modification

Both faces have been flaked. The notches have been bifacially flaked and ground, and the base has been unifacially thinned and ground.

Lithic Type

Swan River chert

Core Shatter (n=8)

Seven pieces of sandstone core shatter cross mend to form a heat-treated(?) cobble. One piece of Swan River chert core shatter was also identified in the assemblage.

Debitage (n=72)

Lithic debitage includes secondary flakes (3), thinning flakes (3), retouch flakes (10), flake fragments (1), shatter (54) and one flattened, elongated, transversely snapped pebble. The major lithic material types are Swan River chert, sandstone and obsidian.

Excavation Unit B

Debitage (n=1)

One proximal biface thinning flake fragment of an unidentified grey chert was recovered.

COMPONENT II

Excavation Unit A

No lithic artifacts were recovered.

Excavation Unit B

Marginally Retouched Flake (n=1)

Form and Modification

This small flake fragment, tabular in cross section, has been bifacially marginally retouched along three edges. The fourth edge represents a snap fracture. A pot lid flake scar is present on one face.

Lithic Type

Unidentified black chert

Debitage (n=7)

One obsidian thinning flake and six pieces of shatter - Swan River chert (2), petrified wood (2), Montana chert (1), and obsidian (1) - were identified in the assemblage.

COMPONENT IIA

No lithic artifacts were recovered.

COMPONENT IIIA

Excavation Unit A

No lithic artifacts were recovered.

Excavation Unit B

Debitage (n=6)

Lithic waste included a bipolar cobble fragment of argilliceous sandstone, two secondary decortication flakes of argilliceous sandstone and quartzite and a secondary flake, a flake fragment and a piece of shatter of Swan River chert.

COMPONENT III

Excavation Unit A

Marginally Retouched Flake (n=1)

Form and Modification

Ovate in form, it exhibits localized unifacial retouch on the dorsal face along the distal left lateral margin, producing a low edge angle of approximately 45^{0}. Bifacial nibbling use wear is present along the proximal right lateral edge. It is triangular in transverse section.

Metrics	
Length	39.3 mm
Width	24.2 mm
Thickness	9.5 mm
Weight	7.6 g

Lithic Type

Chalcedony, milky white grading to yellow brown with cortex present

Core Shatter (n=1)

Form and Modification

One piece of bipolar core shatter exhibits platform crushing on opposite edges. Flaking is multidirectional and flakes scars are ovate to parallel-sided in shape.

Lithic Type

Swan River chert

Debitage (n=22)

Lithic waste products include primary decortication flakes (1), secondary decortication flakes (1), secondary flakes (1), flake fragments (3) and shatter (13). The most frequent raw material is Swan River chert.

Excavation Unit B

Projectile Points (n=7; Figure 28)

Type

Plains Side-notched, Paskapoo Variant (n=2) (after Forbis 1962)

Form

Forms are triangular in outline with straight or slightly convex, sharp, even edges which converge to a slightly offset tip on one. The extreme tip has been broken off on the other. The shoulders are rounded or sharp and acute. The bases are straight. Basal edges are perpendicular or rounded and contracting. Notches are deeply V-shaped on one, less deeply indented on the other.

Metrics (after Forbis 1962)

Length	19.9 mm		17.4 mm	
Width base	14.2 mm		12.7 mm	
Width body	13.7 mm		12.1 mm	
Height of basal edge	3.8 mm	3.5 mm	4.5 mm	3.4 mm
Height of notch opening	2.3 mm	2.8 mm	2.5 mm	3.2 mm
Width neck	9.8 mm		7.4 mm	
Thickness	3.7 mm		3.1 mm	

Modification

Fine bifacial flaking covers the faces. Both specimens exhibit bifacial basal thinning. Unifacial basal edge retouch is present on one point. Marginal retouch is complete on one specimen and occurs on three sides of the other. Neither show evidence of grinding.

Lithic Type

Obsidian

Type

Plains Side-notched, Pekisko Variant (n=2) (after Forbis 1962)

Form

The projectile points are triangular to lanceolate in outline with straight to slightly convex, sharp even edges. Each specimen has one sharp and one rounded, acute shoulder. Basal edges are straight and slightly contracting. Notches vary from widely U-shaped, widely parabolic to narrowly U-shaped and narrowly parabolic; the latter are directed somewhat obliquely. Bases are slightly obliquely to sharply obliquely truncated.

Metrics (after Forbis 1962)

Length	19.1 mm		21.8 mm	
Width base	13.1 mm		12.6 mm	
Width body	11.5 mm		11.4 mm	
Height of basal edge	6.7 mm	3.9 mm	5.2 mm	3.0 mm
Height of notch opening	2.6 mm	3.5 mm	4.0 mm	3.9 mm
Width neck	7.4 mm		7.1 mm	
Thickness	3.6 mm		3.8 mm	

Modification

The points have been bifacially flaked. Fine, oblique, parallel-sided flaking covers one specimen. Notches have been bifacially flaked, and the base has been bifacially thinned on one point. Grinding is not visible on the bases or on the basal edges.

Lithic Type

Swan River chert; Montana chert

Type

Fragmentary Unclassified (n=3)

One point tip fragment is lanceolate in outline. The slightly sinuous edges, one straight and one convex, converge to a rounded, slightly offset tip. It is biconvex in transverse section and has been bifacially flaked with unifacial marginal retouch and step fracturing along one edge. The material used for this point was a fine grade brown chert.

The second specimen is an obsidian base fragment exhibiting basal bifacial thinning scars, long and parallel-sided on one face and short and irregular on the other. It has been broken transversely across both notches and longitudinally across one. It is unclear whether side or corner notches are represented. The point has been basally ground. The transverse section is indeterminate in shape.

The third point is an incomplete blade of Swan River chert which has been transversely truncated across the stem. The edges are straight, converging to slightly convex at the tip. Shoulders are rounded and acute. The notches appear to have been straight-sided; their direction is uncertain. Although crudely bifacially flaked, it exhibits fine bifacial edge retouch.

Biface Fragments (n=2; Figure 28)

Type

Lanceolate (n=1)

Form

One fragment has been transversely truncated across the midsection. It is thinly biconvex in transverse section with nearly straight lateral edges. It probably represents a projectile point preform broken during manufacture.

Metrics

Length	n/a
Width	16.6 mm
Thickness	3.2 mm
Weight	1.5 g

Modification

Irregular thinning flake scars cover both surfaces. There is no evidence of marginal retouch, nibbling use wear or grinding.

Lithic Type

Montana chert

Type

Fragmented unclassifiable (n=1)

Form and Modification

One tip section has convex edges converging to an offset point. Irregular bifacial flaking covers both faces. Neither marginal retouch nor nibbling use wear are present. Both overall form and transverse section are indeterminate because of the small size.

Uniface Fragments (n=1; Figure 28)

Form and Modification

Roughly triangular in cross section with a steep ridge running along the midline, it has been obliquely truncated across the midsection. It is lanceolate in outline, the roughly straight edges converge to a rounded tip. Irregular flaking is present only on one surface, although marginal retouch flaking is bifacial.

Lithic Type

Obsidian

Unidentified Tool Fragment (n=1; Figure 28)

Form and Modification

The specimen exhibits thinning flake scars across the dorsal surface. The ventral surface is unmodified. There is no indication of edge retouch or use wear. The thinning flake scars show no platform or origin on the specimen, thus the fragment is only a portion of a larger tool. It may have broken during the reduction process.

Lithic Type

Chalcedony

Endscraper Fragment (n=1; Figure 28)

This specimen has been transversely truncated; consequently, body outline and dorsal modification are indeterminate. In transverse section it is dorsally convex.

Metrics

Width	25.4 mm

Modification

Fashioned from a split pebble, the artifact exhibits steeply angled retouch along the distal and lateral margins (70^{0} and 55^{0}, respectively). Use wear, in the form of step fractures and nibbling retouch, is apparent.

Lithic Type

Avon (?) chert

Marginally Retouched Flakes (n=6)

Generally occurring on secondary flake fragments, marginal retouch is present in the form of either unifacial (5, usually dorsal) or bifacial (2) flake scars along the lateral edges. One piece of silicified mudstone exhibits a 60^{0} angle of retouch; it may have functioned as a scraper. Step-fracture use wear is also apparent on this and two other specimens. The remaining five flake fragments exhibit low angles of edge retouch; presumably they were used in a cutting function.

One obsidian flake fragment has been bifacially retouched along the proximal margin. Bifacial nibbling use wear occurs in localized areas along the proximal, lateral and distal edges.

Lithic Type

Obsidian (2), silicified mudstone (1), chalcedony (2) and Swan River chert (1)

Marginally Retouched Shatter (n=1)

One piece of obsidian shatter has been bifacially retouched along one margin. Some crushing and step-fracturing are visible as well.

Utilized Flakes (n=8)

The majority of the flakes in this category exhibit a localized nibbling use retouch on the lateral margins which is either bifacial (2), dorsally unifacial (1) or ventrally unifacial (2). One silicified siltstone specimen (of two catalogued pieces which cross mend) is a water worn bipolar core fragment which was subsequently utilized as there is some evidence of grinding and step fracturing on the dorsal surface of the distal margin. One of the obsidian flakes is a platform preparation flake with bifacial nibbling use wear, the location of which suggests that the flake may have functioned as a drill or graver.

Lithic Type

Obsidian (5), chalcedony (1) and silicified siltstone (2)

Utilized Shatter (n=2)

Two small fragments of grey chert shatter exhibit unifacial nibbling along one margin.

Core Shatter (n=3)

Two pieces of Swan River chert and one piece of obsidian core shatter exhibit platform crushing for flake removal.

Platform Preparation Flake (n=1)

One obsidian flake exhibits crushing and flake removal at the proximal end from platform preparation of the original core.

Debitage (n=571)

Lithic waste material includes secondary decortication flakes (5), bipolar split pebble (1), secondary flakes (19), thinning flakes (98), retouch flakes (107), flake fragments (106) and shatter (243). Obsidian and Swan River chert account for the majority of the debitage with significant amounts of unidentified grey chert, chalcedony, petrified wood, red-brown chert and Montana chert also present.

COMPONENT IV

Excavation Unit A

No lithic artifacts were recovered.

Excavation Unit B

Core Shatter (n=1)

One piece of Swan River chert block core shatter exhibiting platform crushing was identified in the assemblage.

Debitage (n=1)

One quartzite secondary decortication flake was recovered.

COMPONENT V

Excavation Unit A

Debitage (n=1)

One piece of ironstone (?) shatter with a pot lid fracture on the dorsal surface was recovered from Component V of Unit A.

Excavation Unit B

No lithic artifacts were recovered.

COMPONENT VI

No lithic artifacts were recovered.

COMPONENT VII

No lithic artifacts were recovered.

RIVERBANK PROFILE COLLECTION

Projectile Point (n=3; Figure 28)

Type

Plains Side-notched, one possibly Paskapoo Variant (n=2)

Form

These side-notched base fragments have been transversely truncated across the stems. One of the point fragments has also been longitudinally snapped at the notched base. Both are biconvex in transverse cross section. Basal edge shape is low and rounded on one specimen and high and perpendicular on the other. The notches appear to have been parabolic in shape on one and deeply U-shaped on the other. Bases range from slightly concave to straight.

Metrics

Length	n/a	n/a
Width body	n/a	n/a
Width base	n/a	16.3 mm
Thickness	3.0 mm	3.5 mm
Basal Edge Height	n/a-3.2 mm	6.6-6.9 mm

Modification

Bifacial flaking with finer, generally bifacial, marginal retouch along the notches and basal edges is evident. Bases have been bifacially thinned, and one base has been ground.

Lithic Type

Obsidian

Type

Fragmentary unclassifiable (n=1)

One finely bifacially retouched edge segment with shoulder portion has an unground, slightly sinuous edge and probably represents a lateral margin of a projectile point. It is made of obsidian.

Core Fragments (n=1)

One piece of petrified wood exhibits bidirectional battering for core preparation with multiple hinge fracture scars along one face.

Core Shatter (n=2)

One piece of tabular core shatter of petrified wood exhibits bifacial hinge fracture scars along one edge.

Platform Preparation Flakes (n=1)

One obsidian flake exhibits crushing and battering along the proximal edge. Short hinge fracture flakes have been driven off from the dorsal surface of the proximal edge.

Debitage (n=29)

Lithic tool production activities are represented by the following debitage types: secondary decortication flakes (2), bipolar split pebble (1), secondary flakes (2), thinning flakes (3), retouch flakes (2), flake fragments (3) and shatter (16). Swan River chert, petrified wood, obsidian and sandstone represent the major lithic material types used.

CERAMICS

INTRODUCTION

The ceramic assemblage of DlPd-3 is described using the taxonomic classification developed by Byrne (1973). For complete definitions of Byrne's type classes the reader is referred to the original publication;

his class headings are used here. Only 14 potsherds were recovered during the 1980 investigations. Of these, two are rimsherds (Table 16).

SMOOTHED CORD MARKED CLASS (B.)

Rim Sherd (n=1; Figure 29)

One tan-gray rim sherd with a parallel-folded rim form and a slightly rounded lip has a thickness of 11 mm and a maximum rim width of 15 mm. This specimen most closely resembles Br16 in Byrne's typology. The specimen exhibits dentate stamping on the exterior, produced by jabbing a toothed object into the surface. Each depression is more or less square in form and about 1.5 mm wide. Spacing is about 3.8 mm between impressions. Curiously, similar stamping is present on the interior of the sherd about 10 mm below the lip. In this case, the toothed object was dragged out of the surface horizontally. It is unlikely that this stamping would be been visible when the vessel was complete.

Body Sherd (n=1)

One body sherd, tan-gray in colour and 8 mm thick, exhibits a blocky texture and has a visible temper of granite particles over 2 mm in size.

TRUNCATED FABRIC/NET IMPRESSED CLASS (D.)

Rim Sherd (n=1; Figure 29)

Heavy exterior surface weathering makes the identification of this specimen difficult; however, the slight, smoothed pitting resembles Byrne's truncated fabric/net impressed category. The parallel-folded, flat-lipped profile does not have an identical counterpart in Byrne's system. Blocky in texture with only a few visible granite temper grains, it is 10 mm thick and has a maximum rim width of 15 mm. Both surfaces are blackened and exhibit slight burnishing.

Table 16. List of ceramics.

Class (Byrne 1973)	N	Portion	Provenience
B. Smoothed Cord Marked	1	Rim	Component III, Unit A
	1	Body	Component III, Unit A
D. Truncated Fabric/Net Impressed	1	Rim	Component III, Unit A
F. Thick Smooth	1(?)	Body	Component I, Unit A
	3	Body	Component III, Unit A
x. Indeterminate	1	Body	Component III, Unit B
	6	Body	Component III, Unit A

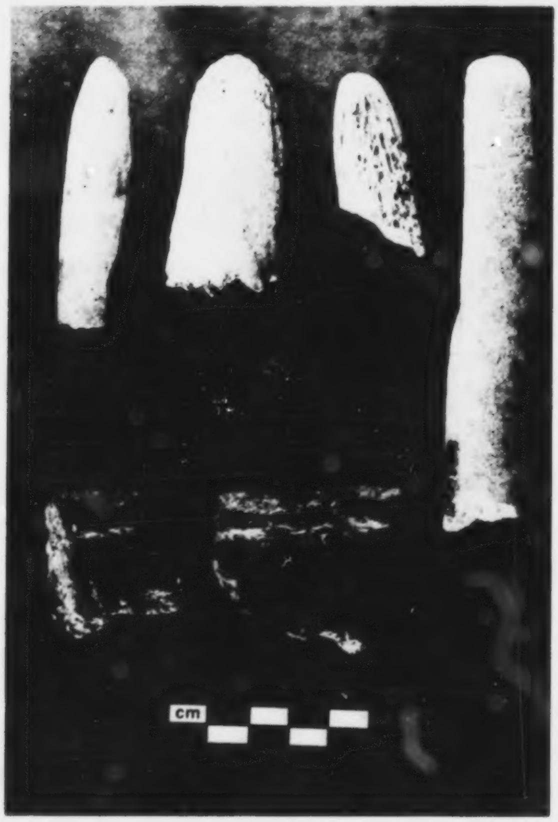

Figure 29. Bone and ceramic artifacts: bone tools (a-d), smoothed cord marked rim (e), truncated fabric/net impressed rim (f); provenience: Unit B, Component III (a), Unit B, Component I (b), Unit B, Component IV (c, d), Unit A, Component III (e, f).

THICK SMOOTH CLASS (F.)

Body Sherds (n=4)

Two body sherds were smoothed on both surfaces and one on the exterior. They have visible granite temper particles and thicknesses of 13-15 mm. The fourth sherd was smoothed on the interior; only a small portion of the exterior surface remains.

INDETERMINATE CLASS (n=7) (X.)

These fragments, because of size and weathering, are unidentifiable to type of surface finish. Displaying some degree of external convexity, they are body fragments.

BONE AND SHELL ARTIFACTS

BONE BEADS

The manufacture of bone beads at the Ross site is demonstrated by both the finished product and waste debris (Table 17). Metapodials of Canis and a lagomorph and a radius of vulpes, were selected for this industry. All were grooved and snapped (Figure 30).

A complete tubular bead made from a shaft segment of a canid metapodial is present. The bead is about 7 mm long with a 4 mm long extension on one side. The latter segment is separated from the main body by a groove and represents an error in breakage. Despite this irregularity, the specimen exhibits extensive polishing, suggesting it was considered acceptable despite its irregular shape. Two similar specimens are also present but show no evidence of polishing.

Six canid proximal metatarsals and six canid proximal metacarpals represent waste products from bead manufacture. The proximal metatarsal fragments range from 2.0 to 3.5 cm long; one shows grooving about 7 mm from the broken (midshaft) end. All are characteristically lipped around the marrow cavity. The six proximal metacarpals range from 13 to 26 mm long and illustrate the same groove and snap technique. As well, six canid distal metapodials represent similar waste products.

Table 17. Bone beads and bead manufacturing debris.

Specimen	Provenience Unit/Component	Description
2532	B/III	Polished metapodial bead, canid
2701	B/III	Bead Blank, metapodial, canid
2702	B/III	Bead Blank, metapodial, canid
2704	B/III	Proximal metatarsal waste, canid
2709	B/III	Proximal metatarsal waste, canid
2712	B/III	Proximal metatarsal waste, canid
2714	B/III	Proximal metatarsal waste, canid
2716	B/III	Proximal metatarsal waste, canid
2636	B/III	Proximal metatarsal waste, canid
2567.1	B/III	Proximal metacarpal waste, canid
2707	B/III	Proximal metacarpal waste, canid
2710	B/III	Proximal metacarpal waste, canid
2711	B/III	Proximal metacarpal waste, canid
2713	B/III	Proximal metacarpal waste, canid
2718	B/III	Proximal metacarpal waste, canid
2567.2	B/III	Distal metapodial waste, canid
2706	B/III	Distal metapodial waste, canid
2708	B/III	Distal metapodial waste, canid
2715.1	B/III	Distal metapodial waste, canid
2715.2	B/III	Distal metapodial waste, canid
2396	B/IV	Distal metapodial waste, canid
2705	B/III	Distal radius waste, *Vulpes*
2703	B/III	Proximal metatarsal waste, *Lepus*

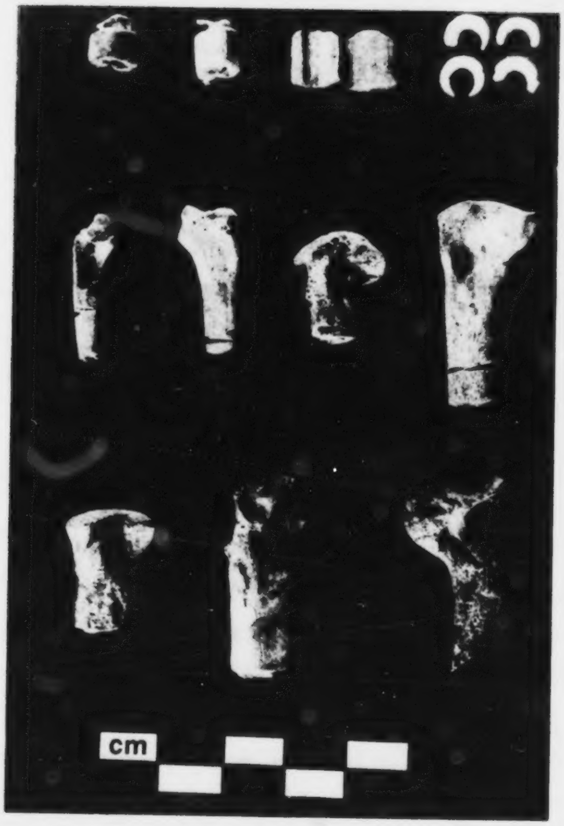

Figure 30. Bone and shell beads: bone beads (a-c), shell bead fragments (d), Lepus metatarsal waste (e), Vulpes radius waste (f), canid metapodial waste (g-j), Ursus phalanx (k); provenience: Unit B, Component III (all).

Two other specimens, a vulpes distal radius and a lepus proximal metatarsal, have also been grooved and snapped for bead production. A complete Ursus third phalanx has been drilled for suspension near the proximal end. The hole is about 6 mm in diameter and is biconical in morphology.

SHELL BEADS

Five shell bead fragments were recovered from Component III in Unit B (Figure 30). These are about 7 mm in diameter and 0.5 to 2.0 mm thick. The apertures are about 4 mm in diameter.

MISCELLANEOUS BONE TOOLS

A rib fragment from Component I, Unit B is rounded at one end. A split rib from Component III, Unit B also shows a rounded end. A split rib with a polished end and a long bone fragment showing a pointed and extensively polished end were recovered from Component IV, Unit B. No specific function can be inferred for these specimens (Figure 29).

MISCELLANEOUS

OCHRE (n=6)

Small amounts of ochre were recovered from both excavation units. Level I of Unit A produced one lump of limonite and two small powdered samples of hematite. Two small lumps of hematite and some hematite particles mixed with soil were recovered from Level III of Unit B.

FLORAL REMAINS (n=1)

One chokecherry seed (*Prunus virginiana*) was recovered from Component III of Unit A.

SHELL REMAINS (n=7)

From Component I (Unit A), one unmodified local pulmonate land snail (*Discus cronkhitei*), complete except for the apex, was identified. From Component III (Unit B) an unmodified bivalve fragment (probably of family *Unionidae*) was recovered.

APPENDIX 2: FAUNAL ANALYSIS

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INTRODUCTION

NATURE OF ASSEMBLAGE

Excavations at DlPd-3 in 1980 produced a total of 4,117 bone fragments from two 2 x 2 m units (Unit A and Unit B), located about 20 m apart. The units were excavated by natural and arbitrary levels, and bones presented to the zooarchaeologist for study were grouped into assemblages by the excavator. Fifteen separate assemblages were recovered from the site, from a total of nine occupation horizons distributed between the two excavation units. Because of the distance between the excavation units, assemblages from each excavation unit are considered separately in this report, although some assemblages may in fact derive from the same occupation horizon. This was done because variation in activity areas across a site might well produce quite distinct faunal assemblages in different parts of the site.

Preservation seems to be good for all assemblages. Very small fragments of fragile cancellous bone have been preserved. Floor plans for certain occupations indicate that articulating bones lie in essentially natural positions. Carnivore gnawing of bones is minimal. Rodent activity is unlikely to have seriously disturbed the site.

The assemblage sizes are unfortunately small. Of the 4,117 bone fragments studied, only 989 (24%) could be identified to species or genus. Of the 31.612 kg of bone studied, 20.1 kg (64%) could be identified. Of the 989 identified bones, 725 were from Bison, 257 from Canis, 4 from Odocoileus and one each from Ursus, Vulpes and a lagomorph. Spermophilus have been excluded from the analysis as it probably represents a species occurring naturally on the site.

Thus, for the major parts of the analysis, the sample of bones consists of the 725 Bison specimens for 15 separate assemblages. This is a very small sample indeed, particularly when one considers that a Bison skeleton will produce at least 200 identifiable elements.

Individual assemblages vary in size from 1 to 1,844 bones, including unidentifiable fragments (Tables 18, 19, 20 and 21). In order to make a valid comparisons between assemblages, samples of adequate size are required. That many of these samples are not adequate can be seen from Table 22. This table provides the number of identified Bison bones versus the number of different element categories found. As one would expect, the number of element categories approaches a maximum figure of 29. (The element categories considered were horn core, skull, mandible, hyoid, cervical, thoracic, lumbar, sacral and caudal vertebrae, ribs, sternum, scapula, humerus, radius, ulna, carpals, metacarpus, metacarpus V, first, second and third phalanges, sesamoids, pelvis, femur, patella, tibia, tarsals, metatarsus, and ossified cartilage.) On the basis of Table 5, most assemblages can be rejected for detailed study because of the small number of identified elements of the most common species. While all assemblages will be discussed in this report, only assemblages from Component III (Unit A) and Components I, III and IV (Unit B) will be considered in detail.

RESEARCH AIMS

Although a wide variety of questions can be approached through the study of faunal remains, this analysis has concentrated on four topics.

Diet

The analysis of diet from faunal remains has reached something of a methodological crisis, with leading exponents of zooarchaeology critical of estimation of meat weights and of the value of quantification procedures which study ratios between species (Grayson 1979). According to Grayson, the most optimistic attitude that one can take is that quantification techniques allow one to arrange species only on an ordinal scale of importance.

Fortunately for Plains archaeologists, Bison was so important in many areas that calculation of the percentage of Bison in the meat diet is superfluous. One can state that almost all the meat consumed at

Table 18. Distribution of bone fragments by component, Unit A.

Component	Bison	Canis	Large Mammal	Medium Mammal	Unidentified	Total
VI	2		5		3	10
V	4		2	1	49	56
IV	2		4		16	22
III	63	16	109		307	495
IIIA	6		3		1	10
IIA	1					1
II	2		1	1	4	8
I	34	53	25		40	152

Table 19. Distribution of bone weights (g) by component, Unit A.

Component	Bison	Canis	Large Mammal	Medium Mammal	Unidentified	Total
VI	34		33		5	72
V	155		10	4	22	191
IV	73		16		6	95
III	3412	85	323		142	3962
IIIA	254		11		1	266
IIA	218					218
II	61		6	1	2	70
I	1970	241	65		17	2293

Table 20. Distribution of bone fragments by component, Unit B.

Component	VII	IV	III	IIIA	IIA	II	I
Bison	2	206	279	29	5	15	75
Canis		9	177			1	1
Odocoileus			3				1
Ursus			1				
Vulpes			1				
Lagomorph			1				
Large mammal	16	297	839	13		35	357
Medium mammal			8				1
Small mammal			6			1	
Bird		1	3				
Unidentified		262	526	18		65	109
Total	18	775	1844	60	5	117	544

Table 21. Distribution of bone weight (in grams) by component, Unit B.

Component	VII	IV	III	IIIA	IIA	II	I
Bison	139	4133	5119	1251	514	582	1282
Canis		42	487			8	14
Odocoileus			12				10
Ursus			2				
Vulpes			1				
Lagomorph			1				
Large mammal	88	613	1043	12		128	1267
Medium mammal			13				1
Small mammal			1			1	
Bird		1	1				
Unidentified		145	229	8		44	86
Total	227	4943	6909	1271	514	763	2660

Table 22. Relationship between number of identified Bison bones and number of element categories in assemblage.

Component	Number of identified Bison bones	Number of element categories
IIA (Unit A)	1	1
II (Unit A)	2	2
IV (Unit A)	2	2
VI (Unit A)	2	2
VII (Unit B)	2	2
V (Unit A)	4	3
IIA (Unit B)	5	2
IIIA (Unit A)	6	4
II (Unit B)	15	8
IIIA (Unit B)	29	12
I (Unit A)	34	12
III (Unit A)	63	15
I (Unit B)	75	18
IV (Unit B)	206	23
III (Unit B)	279	24

DlPd-3 was Bison, assuming that all species eaten are represented by bones. Calculation of meat weights could be important, even if diet was 100 percent derived from Bison. Meat weights might indicate how much meat was eaten during different occupations, and this could be used to estimate population parameters. However, even ignoring the myriad methodological problems associated with estimating meat weights (Wing and Brown 1979:Table 7.3), a 2 x 2 m sample of a particular occupation cannot be used to extrapolate to the occupation as a whole. It has been shown many times for different areas of the world that bones are unevenly distributed over sites (e.g., Driver 1980; Meadow 1978), and there is certainly evidence for this in southern Alberta (e.g., Brumley 1975:Figure 7). Consequently, 2 x 2 m units are probably sampling activity areas and not occupations. Thus, even if estimation of meat weights was a valid procedure, it would be inappropriate to apply it to DlPd-3 as excavated in 1980.

Seasonality

Estimates of seasonality of occupation should be made on large samples of material. Assessments can be made for DlPd-3 on the basis of

Bison tooth eruption and wear for only two specimens, and on the presence of foetal and neonatal bone for two occupations. These will be discussed for the relevant assemblages.

Element Frequency

The frequency of different parts of the skeleton does not usually follow a natural pattern on archaeological sites. While this may be due in part to factors of preservation (Binford and Bertram 1977), cultural factors are almost certainly involved on Plains sites. Analysis of frequency of elements allows one to assess which bones were brought from the kill to the processing or habitation site, and to interpret this in terms of the association of certain bones with certain joints of meat, and the value of certain bones as sources of marrow or grease. In this analysis, fragment counts and weights of fragments have been used to assess element frequency.

Activities Represented

Bones found on archaeological sites are the product of cultural behaviour and, like artifacts, must be considered as representing certain aspects of culture. A number of studies have shown that bones were selectively removed from kill sites (e.g., Frison 1973). This seems to have been done for two reasons: either the bones were removed in association with soft tissue or they were removed for some intrinsic value they possessed. Consequently, bones found on habitation sites may have been deposited there as a result of a number of different activities, such as transportation of meat portions or the hide or selection of bones to be worked into artifacts or bones for the production of marrow and grease.

To assess why bones were brought to a site, one can consider which elements were frequently transported, how bones were treated, and the size of fragments represented. Vehick (1977) has considered certain aspects of this topic. For the purpose of this analysis it will be hypothesized that bones brought back to a site in meat joints are likely to be relatively intact, that bones broken for marrow will also be relatively intact and will be broken into two large pieces and a number of smaller pieces, and that bones smashed for the preparation of grease or bone soup will be very small. On the basis of these hypotheses, all bone fragments were individually weighed. These weights and their distributions are discussed later.

INFORMATION RECORDED

Information about individual fragments was recorded on standard sheets. The following categories were used:

Species

When possible, bone fragments were assigned to a species. If a bone fragment could be assigned confidently to the category "large ungulate," it was assumed to be *Bison*. When this could not be done (usually if the element could not be identified, for example in the case of small long bone fragments) the fragment was classed simply as "large mammal" and assigned as either an axial or long bone fragment. If this was not possible, the bone was considered to be unidentifiable.

Element

Element is simply a designation, such as humerus, mandible, etc.

Side

Three categories were used: left, right and uncertain.

Part

This designation was used to describe which part of the element was present. For example, long bones were divided into proximal, distal and midshaft; vertebrae were divided into centrum, neural arch, neural spine and transverse processes.

Portion

This was an estimate of the proportion of the original element represented by the fragment.

Modification

A record was kept of the location of all breaks and cuts and of the presence of burning.

Postdepositional Modification

All information about non-cultural modifications of the bone fragment was recorded under this category.

Fusion

A record was kept of the state of fusion of all epiphyses.

Weight

All bone fragments were weighed to the nearest gram. In the case of fragments weighing less than 1.5 g (i.e., all fragments to be recorded as weighing 1 g), two sets of records were kept. First, the number of fragments weighing less than 1.5 g were recorded. Thus, 17 fragments weighing less than 1.5 g were recorded as (17 x 1) on the record sheet. Second, the total weight of the fragments was also recorded. Using the above example, a record of (17 x 1) = 10 would be made if the total weight of all fragments of less than 1.5 g was 10 g.

Catalogue Number and Provenience

The final catalogue number of each fragment was recorded, together with information about excavation unit and occupation level.

Standard Measurements

Standard measurements were taken on all measurable bones. The measurement system used was that of von den Driesch (1976). Standard measurements have a wide applicability in zooarchaeology and should be recorded for all sites which contain measurable bones. This is not common practice in Alberta, nor in many areas of the plains. It should be undertaken, however, if archaeologists are ever going to approach seriously the problem of sexing *Bison* bones or the problem of *Bison* responses to climatic change and predation pressures.

THE ASSEMBLAGES

In this section each assemblage is described individually. Because of the previously discussed problems of sample size, very few assemblages are worthy of detailed discussion. Those that are will be left until *Bison* is discussed, because it is the nature of the *Bison* bones which defines assemblage differences. The distribution of identified *Bison* bones is given in Tables 23 and 24. Distribution of other species is given in Tables 25, 26, 27, 28 and 29. These tables should be consulted in conjunction with the following descriptions.

COMPONENT I

Excavation Unit A

Component I is the earliest one defined as a result of the 1980 excavations. In Unit A, a total of 152 bones was recovered, 34 of which were identified as *Bison* and 53 as *Canis*. Bison remains consisted of a variety of scattered bones. Important among these are a virtually complete ulna and radius with articulating carpals and metacarpus, an articulated ankle joint and the posterior portion of a skull. Axial elements are rare, and appendicular elements are more common. This suggests that the activity on this part of the site was probably related to marrow extraction and, in the case of the cranium, extraction of the brain. The complete radius and ulna show evidence of marrow extraction in the form of an opening into the marrow cavity on the anterior face of the radius midshaft.

The canid is identified positively as a coyote. With the exception of a single tarsal bone, all elements are axial, and many lay in articulating positions.

Excavation Unit B

This occupation produced an assemblage of 544 bones; 75 are identified as *Bison*, one as *Canis* and one as *Odocoileus*. From floor plans supplied by the excavator, it can be seen that many of these specimens must have come from a feature, probably one which functioned for processing or cooking meat and bone. A greater variety of elements

Table 23. Distribution of *Bison* elements by counts and weights, Unit A.

	Components							
Element	I	II	IIA	IIIA	III	IV	V	VI
Skull frag	10 (581)				1 (4)		1 (6)	
Hyoid frag					1 (5)			
Cervical frag								1 (64)
Thoracic frag				1 (40)	1 (6)			1 (64)
Lumbar frag					2 (14)			
Caudal whole	1 (17)							
Scapula glen.					1 (66)			
Scapula blade	1 (98)				1 (12)			
Humerus shaft					1 (21)	1 (49)	1 (21)	
Humerus dist.			1 (218)		3 (1082)			
Radius whole	1 (788)							
Radius prox.	1 (52)				1 (42)			
Radius dist.					3 (310)			
Ulna prox.				1 (55)				
Carpal whole	6 (132)				5 (74)			1 (30)
5th MC whole	1 (4)							
MC prox.	1 (98)							
MC shaft	1 (10)				2 (16)			
3rd phalanx		1 (17)			3 (60)			

Table 23. continued.

Element	Components I	II	IIA	IIIA	III	IV	V	VI
Ilium frag.	1 (76)							
Femur shaft					6 (174)			
Tibia prox.					2 (457)			
Tibia shaft				1 (87)	4 (126)			
Tibia dist.	1 (44)				2 (174)			
Tarsal whole	5 (96)				8 (405)			
MT prox.	1 (25)				1 (120)			
MT shaft					1 (15)			
Rib prox.	1 (1)							
Rib shaft		1 (44)		3 (72)	7 (214)	1 (24)		
Sesamoids					6 (14)			
Loose teeth					1 (1)			

is present than in Unit A for the same occupation, but this may be due to the larger assemblage size. Of interest is the increased frequency of axial elements and the large number of small large mammal and unidentifiable fragments. These may suggest the presence of grease preparation in this area.

The single maxilla fragment of *Canis* is identified as coyote (*C. latrans*) on the basis of its similarity to the specimen from Unit A.

A single complete astragalus of *Odocoileus* (either white tailed or mule deer) is identified.

Table 24. Distribution of Bison elements by counts and weights, Unit B.

	Components						
Element	I	II	IIA	IIIA	III	IV	VII
Skull frag	3 (12)			1 (4)	20 (599)	20 (149)	
Horn core					2 (39)		
Maxilla	1 (48)		1 (313)	1 (136)	1 (152)		
Mandible frag	6 (40)	2 (16)			9 (133)	24 (199)	
Hyoid whole	1 (8)					2 (6)	
Hyoid frag						3 (9)	
Cervical whole						4 (347)	
Cervical frag	5 (40)				3 (5)		
Thoracic frag	9 (41)			1 (21)	5 (60)	11 (144)	
Lumbar frag	4 (18)	1 (5)		1 (4)	3 (21)	5 (25)	
Scapula glen					2 (310)	5 (820)	
Scapula blade	1 (19)			1 (30)	5 (212)	5 (152)	
Humerus prox.	4 (23)				1 (7)		
Humerus shaft	3 (26)			2 (137)	5 (113)	3 (123)	
Humerus dist.	1 (20)						
Radius prox.	1 (10)			2 (253)	1 (26)	2 (127)	
Radius shaft				4 (44)	2 (37)		
Radius dist.	1 (17			2 (234)	2 (182)	1 (151)	
Ulna prox.						2 (80)	
Ulna shaft	3 (55)	1 (54)		1 (34)	1 (30)		
Ulna dist.				1 (30)	2 (37)	1 (8)	
Carpal whole				7 (102)	15 (262)	6 (120)	

Table 24. continued.

Element	I	II	IIA	IIIA	III	IV	VII
Carpal frag						1 (7)	
MC prox.					2 (168)		
MC shaft	1 (21)				2 (249)	1 (18)	
MC dist.	1 (101)				1 (12)	1 (114)	
MC V					1 (3)		
1st phalanx	2 (58)				6 (112)	1 (28)	
2nd phalanx	1 (12)	1 (22)		1 (18)	1 (1)	1 (16)	
3rd phalanx					3 (38)	3 (64)	
Ilium frag					2 (59)	1 (12)	
Ischium frag				1 (57)		1 (14)	
Acet. frag	1 (23)						
Acet.+ isch.				1 (88)	1 (161)		
Femur prox.					3 (260)	1 (20)	
Femur shaft	2 (23)	2 (238)				3 (125)	
Femur dist.	1 (21)						
Tibia prox.					1 (228)		
Tibia shaft	6 (418)				7 (131)	3 (262)	
Tibia dist.	3 (25)				2 (199)		
Tarsal whole					1 (78)	3 (110)	
Tarsal frag						1 (22)	
MT prox.					1 (83)	1 (101)	
MT shaft					1 (22)		

Table 24. continued.

	Components						
Element	I	II	IIA	IIIA	III	IV	VII
MT dist.					1 (47)	1 (103)	1 (119)
Rib whole					1 (48)		
Rib prox.			1 (2)	2 (19)		3 (13)	
Rib shaft	11 (167)	5 (198)	3 (199)	2 (39)	91 (754)	64 (485)	
Cartilage					6 (4)	3 (12)	
Sesamoids	1 (3)	2 (6)		1 (1)	17 (48)	5 (11)	
Patella		1 (43)			2 (69)		
Loose teeth	2 (4)				27 (88)	13 (136)	1 (20)

COMPONENT II

Excavation Unit A

Only eight bone fragments were found in this occupation. The significance of low bone frequencies is discussed at the end of this section of the report.

Excavation Unit B

Of 117 fragments found, 15 are identified as Bison and one as Canis. Of the Bison bones, one third are large rib fragments. The Canis bone is also a rib fragment.

COMPONENT IIA

Excavation Unit A

This occupation produced a single distal humerus of Bison.

Table 25. Distribution of *Canis* elements by counts and weights, all components.

	Unit-Component					
Element	A-I	B-I	B-II	A-III	B-III	B-IV
Skull whole	1 (107)					
Skull frag		1 (14)			3 (18)	1 (1)
Mandible	2 (50)			1 (41)		
Hyoid frag					1 (1)	
Loose teeth				3 (5)	72 (37)	1 (1)
Cervical whole	4 (20)			1 (11)	12 (123)	
Cervical frag	7 (13)				1 (1)	1 (1)
Thoracic whole					2 (18)	
Thoracic frag	8 (4)				3 (4)	
Lumbar whole					4 (55)	
Lumbar frag	1 (1)					
Scapula frag				1 (13)	3 (27)	
Humerus prox.					1 (9)	
Humerus shaft					1 (5)	
Humerus dist.					1 (33)	
Radius whole					1 (29)	
Ulna prox.						2 (29)
Carpal whole				3 (5)	3 (5)	
MC whole					1 (5)	
MC prox.					1 (2)	
Pelvis whole	2 (18)					
Femur dist.					1 (31)	

Table 25. continued.

	Unit-Component					
Element	A-I	B-I	B-II	A-III	B-III	B-IV
Fibula prox.					1 (1)	
Fibula shaft				1 (1)	1 (1)	
Fibula dist.					1 (1)	
Tarsal whole	1 (1)			2 (3)	6 (14)	
MT. prox.					16 (24)	
1st phalanx				2 (3)	9 (12)	
2nd phalanx					3 (3)	
3rd phalanx					1 (1)	
Sesamoids				1 (1)	10 (2)	
Metapodial frags					10 (11)	1 (1)
Rib whole					1 (1)	
Rib prox.	7 (10)				1 (3)	2 (5)
Rib shaft	20 (17)		1 (8)	1 (2)	6 (10)	1 (2)

Table 26. Distribution of *Odocoileus* elements by counts and weights.

	Components	
Element	Unit B-I	Unit B-III
Carpal whole		3 (12)
Tarsal whole	1 (10)	

Table 27. Distribution of Ursus elements by counts and weights.

Element	Component Unit B-III
1st phalanx	1 (2)

Table 28. Distribution of lagomorph elements by counts and weights.

Element	Component Unit B-III
MT prox.	1 (1)

Table 29. Distribution of Vulpes elements by counts and weights.

Element	Component Unit B-III
Radius dist.	1 (1)

Excavation Unit B

This occupation produced five Bison bones. One of these is a maxilla with a complete tooth row from P^2 to M^2. M^3 had not erupted at the time of the animal's death. The specimen can be used to assess seasonality. Although P^2 and P^3 were visible, it is likely that dp^2 and dp^3 were still in position. Dp^4 is present in the maxilla and is heavily worn. M^1 had erupted completely at the time of death, and wear is present on all cusps. M^2 had also erupted, with wear mainly on the anterior cusp. This state of tooth eruption and wear is similar to a specimen illustrated by Frison et al. (1978:Figure 52). They assign an age of 2.6 years to the specimen. If comparisons can be made between Bison populations in Alberta and Wyoming, this specimen must have been killed in the fall.

COMPONENT IIIA

Excavation Unit A

Of the 10 bones found, six are identified as Bison.

Excavation Unit B

Of 60 bones recovered, 29 are identified as Bison. Although a range of elements was found, at least two lower forelimbs are represented. Both were smashed to obtain marrow.

A complete Bison maxilla was found and provides evidence of seasonality. The maxilla would have contained dp^2 and dp^3 before death, but these are missing. Dp^4 is still in place. M^1 had erupted. Wear is visible on the anterior cusp, but the posterior part of the tooth is broken. Assessment of the posterior cusp cannot be made. At the time of death M^2 had not erupted above the alveolus. The age at death for this specimen must have been some months earlier than the specimen from Component IIA (Unit B). This suggests a late summer or early fall kill.

COMPONENT III

Excavation Unit A

This is the densest occupation, as represented by faunal remains, of any in Unit A. Of 495 fragments recovered, 63 are identified as *Bison*, and 16 as *Canis*. Floor plans show that bones were scattered across the excavation unit and were not associated with features. Large fragments of long bones were common, while axial fragments were relatively rare. This again suggests the presence of marrow extraction in a Unit A occupation. The canid bones were scattered throughout the unit and were not articulated.

Excavation Unit B

This assemblage is the largest of any recovered from a single occupation at DlPd-3. It contains a total of 1,844 fragments. Of these, 279 are identified as *Bison*, 177 as *Canis*, three as *Odocoileus*, one as *Ursus*, one as *Vulpes* and one as a lagomorph.

The most notable aspect of the *Bison* assemblage is the high frequency of axial elements, particularly ribs, and the presence of large quantities of heavily fragmented bone. These, in conjunction with a possible boiling pit, suggest that this part of the site certainly functioned as a grease preparation area during this occupation period.

At least two foetal skeletons are represented in the *Bison* assemblage. These consist of a humerus midshaft, a radius midshaft, an ulna, a femur midshaft, a tibia midshaft, three ribs, a first phalanx and a second phalanx. In addition, nine very small pieces of ossified costal cartilage may derive from foetal specimens. The sizes of the bones indicate that the specimens were killed well before birth, and a mid-winter kill period can be inferred.

A wide variety of canid remains are present in the assemblage. At lease three individuals are represented. Two mature specimens are represented by nine cervical vertebrae and 16 proximal metatarsi. A single neonatal specimen is represented by a few cervical vertebrae. Nineteen metapodial fragments show evidence of grooving and snapping around the proximal and distal ends of diaphyses. The large numbers of bones from the lower limbs can probably be explained by the presence of this bone working industry.

The bones of Vulpes and the lagomorph had also been sawn for bead production. The third phalanx of Ursus had been drill for suspension, possibly from a necklace. The deer bones consisted of carpals. As will be suggested later, these may also be residues from bone implement manufacture.

COMPONENT IV

Excavation Unit A

Of 22 fragments recovered, two are identified as Bison.

Excavation Unit B

Of 775 bones in the assemblage, 206 are identified as Bison and nine as Canis. A wide variety of Bison bones are present, dominated by cranial and axial elements.

There is some evidence for seasonality based on Bison bone. A right and left humerus midshaft are from an individual which was definitely killed postnatally. Comparison of the specimens with modern Bos material shows that they are of a similar size to a modern three or four month old calf. As Bison is generally larger than Bos, this would seem to indicate a late spring or summer occupation.

At least two canid individuals can be discerned. A mature specimen is represented by a number of bones, including a pair of ulnae. A neonatal specimen is represented by a maxilla fragment containing dp^2.

COMPONENT V

Excavation Unit A

This occupation is found only in Unit A. Of 56 fragments recovered, four were identified as Bison.

COMPONENT VI

Excavation Unit A

This occupation occurs only in Unit A. Two *Bison* bones were identified from an assemblage of 10 fragments.

COMPONENT VII

Excavation Unit B

This occupation occurs only in Unit B. Of 18 bone fragments found, two are identified as *Bison*.

DISCUSSION

As can be seen from the descriptions above, the total number of bones in an assemblage, as well as the number of identified bones, varies considerably from one occupation to another. This variation is almost impossible to interpret because the sampled area of the site is so small. Lack of bones in a particular 2 x 2 m excavation unit for a particular occupation could result from a number of factors. Lack of bones might indicate the limits of spread of occupational debris. It could indicate a very short occupation which produced low bone density. It could simply indicate an area of a site where activities not associated with bone deposition took place. Without excavation of a large contiguous area such possibilities cannot be explored further.

DISCUSSION OF SPECIES

BISON

Species and Biometrics

The *Bison* bones can be assumed to be from the modern Plains bison, *Bison bison bison*. Standard measurements, following von den Driesch (1976), are presented in Table 30. The number of measurable bones is too small to assess proportions of male and female individuals represented;

Table 30. Measurements of *Bison* bones (mm).

Scapula

Provenience	LG	BG	SLC
Unit A-III	60.7	50.3	
Unit B-III	60.9	52.9	
Unit B-III	63.7		67.7
Unit B-IV			50.7
Unit B-IV	66.0		63.7
Unit B-IV	72.5	64.8	77.0

Humerus

Provenience	Bd	BT
Unit A-IIA	85.0	79.0
Unit A-III	89.0	82.0
Unit A-III	104.6	92.9

Radius

Provenience	Bp	Bfd	Bd
Unit A-I	98.1	86.5	94.4
Unit A-III		72.8	78.9
Unit A-III		71.9	78.7
Unit B-IIIA	85.4		
Unit B-IIIA	85.2		
Unit B-III		69.8	72.0
Unit B-III		72.8	75.6
Unit B-IV		82.2	91.3
Unit B-IV	83.7		

Ulna

Provenience	BPC
Unit A-I	56.6

Table 30. continued.

Provenience	Measurements		
	Metacarpus		
	Bp	Bd	
Unit A-I	74.0		
Unit B-III	63.1		
Unit B-III	64.3		
Unit B-I		75.6	
Unit B-III		64.8	
Unit B-III		66.9	
Unit B-IV		73.4	
	Femur		
	DC		
Unit B-III	51.8		
	Tibia		
	Bd		
Unit A-III	77.8		
Unit A-III	68.9		
Unit B-III	65.6		
	Metatarsus		
	Bp	Bd	
Unit A-III	58.2		
Unit B-IV	48.5		
Unit B-IV		59.9	
Unit B-VII		59.7	
	Astragalus		
	GLl	GLm	Bd
Unit A-I	68.4	63.9	42.6
Unit A-III	79.0	73.1	52.1
Unit A-III	76.5	70.8	50.5
Unit B-III	71.3	66.2	47.9
Unit B-IV	74.5	69.6	49.3

however, the most common measurements, such as radius Bd, suggest that both male and female animals are represented.

Seasonality of Kills

The greater part of the admittedly small number of seasonality estimates suggest fall to winter killing of Bison. However, the neonatal humeri from Component IV (Unit B) must represent a late spring or summer kill, assuming that they are from an individual born during the normal calving season.

Element Frequency

Frequency of all elements except foetal bone is presented in Tables 23 and 24. Frequency is calculated on the basis of number of identified fragments (the first figures in each column) and on the basis of fragment weights (the figures in parentheses). As noted previously, only certain assemblages are suitable for detailed analysis. Tables 31 and 32 show the frequency distribution of selectively grouped elements by fragment number and by weight. Bones were grouped into eight categories: head (skull, mandible, teeth and hyoid), trunk (vertebrae and ribs), girdles (scapula and pelvis), upper fore limb (humerus, radius and ulna), lower fore limb (carpals and metacarpus), upper hind limb (femur, patella and tibia), lower hind limb (tarsals and metatarsus), and extremities (phalanges and sesamoids).

The distributions show that the assemblages vary considerably in the elements they contain. Components I, III and IV in Unit B are dominated by axial elements in terms of fragment counts, whereas there are three times as many appendicular as axial elements in Component III (Unit A). When weights of fragments are considered, differences can still be seen between the assemblages. Component III (Unit A) is still dominated by appendicular elements. Components III and IV (Unit B) are still dominated by axial elements. However, there is a shift in emphasis in Component I (Unit B) from axial to appendicular elements when weight is considered. Components III and IV (Unit B) are certainly distinct from Component III (Unit A). The status of Component I (Unit B) is questionable.

Table 31. Distribution of selected *Bison* elements by fragment count.

	Units-Components			
Bone Groups	B-I	B-III	B-IV	A-III
Head	13 (17.3%)	59 (23.3%)	62 (30.7%)	3 (4.8%)
Trunk	29 (38.7%)	103 (40.7%)	87 (43.1%)	10 (15.9%)
Girdles	2 (2.7%)	11 (4.3%)	12 (5.9%)	2 (3.2%)
Upper fore	13 (17.3%)	14 (5.5%)	9 (4.5%)	8 (12.7%)
Lower fore	2 (2.7%)	20 (7.9%)	9 (4.5%)	7 (11.1%)
Upper hind	12 (16.0%)	15 (5.9%)	7 (3.5%)	14 (22.2%)
Lower hind	0	4 (1.6%)	6 (3.0%)	10 (15.9%)
Extremities	4 (5.3%)	27 (10.7%)	10 (5.0%)	9 (14.3%)

Table 32. Distribution of selected *Bison* elements by weight (g).

	Units-Components			
Bone Groups	B-I	B-III	B-IV	A-III
Head	102 (8.2%)	971 (19.1%)	499 (12.1%)	10 (0.3%)
Trunk	266 (21.4%)	888 (17.5%)	1014 (24.6%)	234 (6.9%)
Girdles	42 (3.4%)	780 (15.3%)	998 (24.2%)	78 (2.3%)
Upper fore	151 (12.1%)	442 (8.7%)	489 (11.9%)	1455 (42.8%)
Lower fore	122 (9.8%)	691 (13.6%)	259 (6.3%)	90 (2.6%)
Upper hind	487 (39.1%)	887 (17.4%)	407 (9.9%)	931 (27.4%)
Lower hind	0	230 (4.5%)	336 (8.2%)	540 (15.9%)
Extremities	73 (5.9%)	199 (3.9%)	119 (2.9%)	74 (2.1%)

It has been suggested that differences in element frequency may reflect differences in activity areas. Of the four occupations considered here, Components I and III (Unit B) are associated with features that may be associated with either cooking or grease production. These occupations also contain quantities of fire-modified rock. Component III (Unit A) is certainly not associated with such features. This limited information suggests that there may be a correlation between a high proportion of axial fragments and features which are probably associated with meat or bone processing. The absence of such features seems to be correlated with a higher proportion of appendicular fragments and marrow extraction.

An attempt was made to refine this analysis by considering all fragments from an occupation which could be defined as large mammal, as well as those which were definitely identified as *Bison*. In view of the preponderance of *Bison* bones at the site, it seems reasonable to assume that all fragments which can be identified as large mammal are probably from *Bison*. As these fragments could be characterized as either axial or long bone, it is possible to plot the frequency of certain weight categories for the two broadly defined categories. The results are presented in Tables 33 and 34. These tables show what proportion of an assemblage consists of bone fragments of certain weights. Table 33 plots the weight of axial fragments, and Table 34 plots the weight of long bone fragments. The frequency of weights is plotted to the nearest gram for bones ranging in weight from less than 1.5 g to 15.5 g. All bones weighing more than 15.5 g have been grouped together for this analysis. This is because beyond 15.5 g there are relatively few bones with a wide range of weight values. Axial fragments were defined as any identified *Bison* bone in the categories skull, mandible, hyoid, vertebrae, ribs, scapula and pelvis, and as any large mammal fragments which could be assumed to be from such categories on the basis of morphological characteristics. Long bone fragments were defined as any identified *Bison* bone from the categories humerus, radius, ulna, metacarpus, femur, tibia, metatarsus, and as any large mammal fragments which could be assigned to the long bone category on the basis of morphology.

Table 33. Frequency (%) of all large mammal axial fragments (except teeth) by weight categories.

Weight of Individual Fragments (g)	Unit-Components			
	B-I	B-III	B-IV	A-III
1	68.4	78.9	59.0	51.1
2	9.9	6.7	12.1	16.3
3	4.5	3.1	6.9	5.4
4	3.6	1.2	2.2	6.5
5	1.8	1.5	3.3	4.3
6	2.3	1.4	1.1	3.3
7	1.8	0.6	1.1	-
8	1.8	0.6	1.4	2.2
9	-	0.7	1.4	-
10	0.5	0.5	0.3	1.1
11	-	0.4	0.6	-
12	0.5	0.2	1.1	1.1
13	-	0.2	0.8	-
14	-	0.4	1.4	-
15	-	0.1	0.3	2.2
more than 15	5.0	3.3	7.2	6.5

As can be seen from Table 33, the distribution of axial weights is similar for all occupations, although Component III (Unit A) has the lowest frequency of axial fragments weighing less than 1.5 g.

Distribution of long bone weights reveals more differences (Table 34). Component III (Unit A) stands out as the most divergent from the other three, with a high percentage of fragments weighing more than 15.5 g and the lowest percentage of fragments weighing less than 1.5 g. This distribution lends support to the idea that Component III (Unit A) is qualitatively different from the other three assemblages. I would suggest that this assemblage is the result of a concentration upon marrow extraction, whereas the other assemblages are the result of cooking axial bones and their associated meat, as well as preparing bone grease.

However, the differences are not as obvious as might be expected. Axial weights do not reveal major differences between assemblages. This may be due to the fact that axial elements tend to fragment more easily than long bones, resulting in the natural production of small axial fragments wherever axial bone is deposited. Alternatively, the fact that

Table 34. Frequency (%) of all large mammal long bone fragments by weight categories.

Weight of Individual Fragments (g)	Unit-Components			
	B-I	B-III	B-IV	A-III
1	21.5	32.2	15.1	7.0
2	14.5	16.3	14.2	1.8
3	5.5	8.4	7.5	8.8
4	8.5	8.4	7.5	5.3
5	10.0	4.2	7.5	10.5
6	6.0	3.7	13.2	5.3
7	4.5	2.8	0.9	3.5
8	3.0	3.7	4.7	1.8
9	2.0	1.4	-	3.5
10	3.0	1.9	0.9	8.8
11	2.5	0.9	6.6	1.8
12	-	1.4	3.8	3.5
13	2.5	0.5	-	1.8
14	1.0	1.9	0.9	1.8
15	0.5	1.4	-	1.8
more than 15	15.0	10.7	16.0	33.3

differences can be seen in terms of long bone frequency and long bone weights could be interpreted to mean that activities which were connected with marrow extraction were localized, whereas activities connected with axial bone were ubiquitous. It might be possible to test these hypotheses through the analysis of bones derived from extensive excavations of single components, rather than from excavations which emphasize stratigraphy over horizontal mapping.

At present, the only conclusions which can be drawn from assemblages in terms of element frequency are the following:

(1) The frequency of axial and appendicular elements varies spatially; therefore, without excavating large areas, one cannot interpret bone frequencies for occupations as a whole.

(2) The frequency of axial and appendicular elements may relate to the presence/absence of certain feature types.

(3) Bone weights can provide information about differences between assemblages, but excavation techniques different to those employed at DlPd-3 in 1980 would be required to study this phenomenon further.

Butchery

As many of the Bison bones brought to DlPd-3 were probably broken for marrow extraction or grease preparation, it is difficult to define the presence of primary butchering on the bones. It could be argued that butchery analysis should be considered only when one is dealing with a kill site, as this is presumably where butchery of individual animals took place. Therefore, one cannot assess whether bone portions found at DlPd-3 are the result of breakage during the primary butchering process or the result of subsequent treatment of bones.

A few general points can be made, however. Skulls and mandibles are generally heavily fragmented. Skulls which were brought back to DlPd-3 relatively intact seem to have been broken for the extraction of the brain. There is good evidence to suggest that the rib cage was removed from the animal at the kill and transported back to the habitation or processing site. Of 195 rib fragments identified at DlPd-3, only eight proximal fragments were recorded. This accords with analysis of other kill sites where there is evidence that rib cages were removed by smashing through the proximal ends of the ribs, which were left attached to the thoracic vertebrae (e.g., Frison 1973). The lack of sternal fragments at DlPd-3 suggests that rib cages were divided into two halves before being transported. The lack of caudal vertebrae may demonstrate that these elements were removed with the hide, which may have been processed in an unexcavated part of the site.

Relatively little can be said about butchery of the limbs, except to note that their main value to the site's inhabitants was for marrow once the meat had been stripped. All long bones found at DlPd-3 had been broken to expose the marrow cavity. In view of the thickness of meat surrounding many limb bones, it does not seem likely that broken long bones indicate points at which the limbs were divided into meat portions. I would view the breakage points of all limb bones at DlPd-3 as indicators of how marrow was extracted.

Bone Tools

Bison bones were occasionally worked into tools. Specimen number 2868 from Component I (Unit B) is the midsection of a rib which has been artificially rounded at one end. Specimen number 2627 from Component III

(Unit B) is a split rib which has been rounded at one end and which exhibits smoothing on the cortical surface. From the same occupation, specimen number 2794 is a split rib with evidence of smoothing on the cortical tissue. Specimen number 2442 from Component IV (Unit B) is similar to specimen 2868.

CANIS

Species and Biometrics

Speciation of canids on the Plains has only been attempted through the analysis of mandibles and skulls. Consequently, it is often not possible to speciate postcranial bones. Furthermore, the ability of the domestic dog to breed with coyote and wolf may further complicate analysis. Standard measurements of canid bones are presented in Table 35.

On the basis of gross morphology, the almost complete cranium from Component I (Unit A) can be assigned to *Canis latrans* with some confidence. It is identical to modern specimens. The mandibles associated with this skull have a ratio of length of M_1 to breadth of mandible below M_1 of 1.9:1. I have established that this ratio is valid for differentiating the three canid species for most specimens in Alberta (Driver n.d.). The mandible from Component III (Unit A) has a ratio of 1.96:1. Therefore, it is probably from *C. latrans*. Long bones from various occupations seem to be larger than modern *C. latrans*. This may indicate the presence of either wolf or dog, both of which were larger than coyote prehistorically (Driver n.d.); however, until further studies are undertaken this cannot be demonstrated. Again, it is worth noting that the failure of archaeologists to report standard measurements can only hinder such studies.

Function of Canids in the Economy

The function of canids in the subsistence economy cannot be adequately documented on the basis of the sample. If they were eaten by humans, their food value must have been relatively minor compared with *Bison*. The presence of canid bones in the pit feature of Component III (Unit B) could indicate that they were eaten, but this depends upon the excavator's interpretation of the feature.

Table 35. Measurements of Canis (mm).

			Measurements				
Provenience	I_3-M_3	C-M_3	P_1-M_3	P_1-P_4	M_1-M_3	Length M_1	Width Below M_1
Unit A-I	94.0	83.4	79.7	44.6	36.4	20.9	11.0
Unit A-III			81.7	42.9		24.5	12.5
			Scapula				
		GLP	LG	BG			
Unit A-III	32.9	28.8	20.9				
Unit B-III	39.0	35.2	23.7				
			Humerus				
			Bd				
Unit B-III			40.0				
			Radius				
	GL	Bp	Bd				
Unit B-III	180.6	24.0	29.4				
			Femur				
			Bd				
Unit B-III			37.4				

Canids were certainly butchered. The skeleton of the coyote in Component I (Unit A) displayed skinning cuts on the cranium. The cervical vertebrae had been detached from the rest of the vertebral column by a blow which smashed the seventh cervical. The limbs were removed from the carcass, as was the posterior part of the vertebral column. From Component III (Unit B) articulated vertebral elements were recovered, including the cervical, thoracic and lumbar regions.

Even if canids were not eaten, they certainly supplied raw material. The skinning marks on the Component I (Unit A) specimen have been mentioned already. Presumably canid skins were useful. It is possible that teeth were deliberately removed from the maxilla and mandible, as evidenced by the large number of dental fragments in Component III (Unit B). As this occupation contains other evidence for bone working (see below and sections on other species), it is possible that teeth were being used to form pendants or other decorative objects.

Canid metapodials were used to manufacture bone beads. This activity is represented in Component III (Unit B). Metapodials were grooved and then snapped at the proximal and distal ends of the diaphysis. This resulted in the production of a tubular piece of bone, as well as two waste pieces. The bone tubes were grounded and polished to form beads, one of which was found in the bone working area.

SPERMOPHILUS

Three bones of this genus (probably _S. richardsonii_) were identified but have been excluded from consideration in the assemblage analyses because they probably represent natural deaths. A complete mandible was found in Component III (Unit A) and a humerus and metatarsus in Component I (Unit A).

LAGOMORPH

A single metatarsus was recovered from Component III (Unit B). Like the canid metapodials it has been grooved and snapped for the production of tubular bone beads.

VULPES

This genus is represented by a single bone from Component III (Unit B). The bone, a distal radius, has been grooved and snapped. Comparison of the specimen with the red fox (_Vulpes vulpes_) shows that it is somewhat smaller than modern specimens. It could be from _Vulpes velox_, but a lack of comparative specimens precludes definite identification.

URSUS

A third phalanx of this genus was identified from Component III (Unit B). Size suggests black bear (_Ursus americanus_). The proximal end of the bone has been drilled in a medio-lateral direction, presumably for suspension on a necklace or pendant.

ODOCOILEUS

A single astragalus was found in Component I (Unit B). Frison et al. (1978) note the Odocoileus metapodials may be made into tools and that a preliminary step in doing so is the removal of carpals and tarsals from the proximal end. As the three carpals were found in a bone working area, they may represent such an activity.

CONCLUSIONS

It has been noted a number of times in this report that the sample of bones presented for analysis is (a) very small in terms of the number of identified specimens, and (b) excavated in such a way as to make general conclusions difficult. As the purpose of the excavations was not directed towards analysis of spatial patterning (Rod Vickers, personal communication 1980), the fault does not lie with the excavator. However, if faunal studies were to be pursued seriously at DlPd-3 (and the site certainly warrants further study of faunal remains), it would be necessary to obtain a much larger sample of bones than has been reported on in this analysis. Such samples should be drawn from excavations which attempt to sample occupation horizons much more completely than was done in 1980. One cannot assume that a 2 x 2 m excavation unit will provide an assemblage that is typical of the occupation as a whole, except in the most general way. Indeed, given that different activities have been demonstrated by this analysis, there may be no such thing as a "typical" faunal assemblage for an occupation horizon. Instead, we should be assessing faunal remains in terms of activity areas, not in terms of gross characteristics of occupations, which may be no more than agglomerations of activity areas.

Nevertheless, some conclusions can be made. Bison was undoubtedly the main food species at DlPd-3. The food contribution of any other species must have been very small. Analysis of the frequency of different parts of the Bison skeleton suggests that different activity areas are present in the site, but larger excavations would be needed to isolate such areas for further study. The analysis of fragment weights may also be a useful technique for defining different types of assemblages, although this method certainly requires further testing on larger samples, as well as a more refined methodology.

Of other species found in the assemblages, Canis is best represented. All other species are represented by bones which are probably on site because of their value as artifacts. Some of the canid bones fall into this category as well.

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